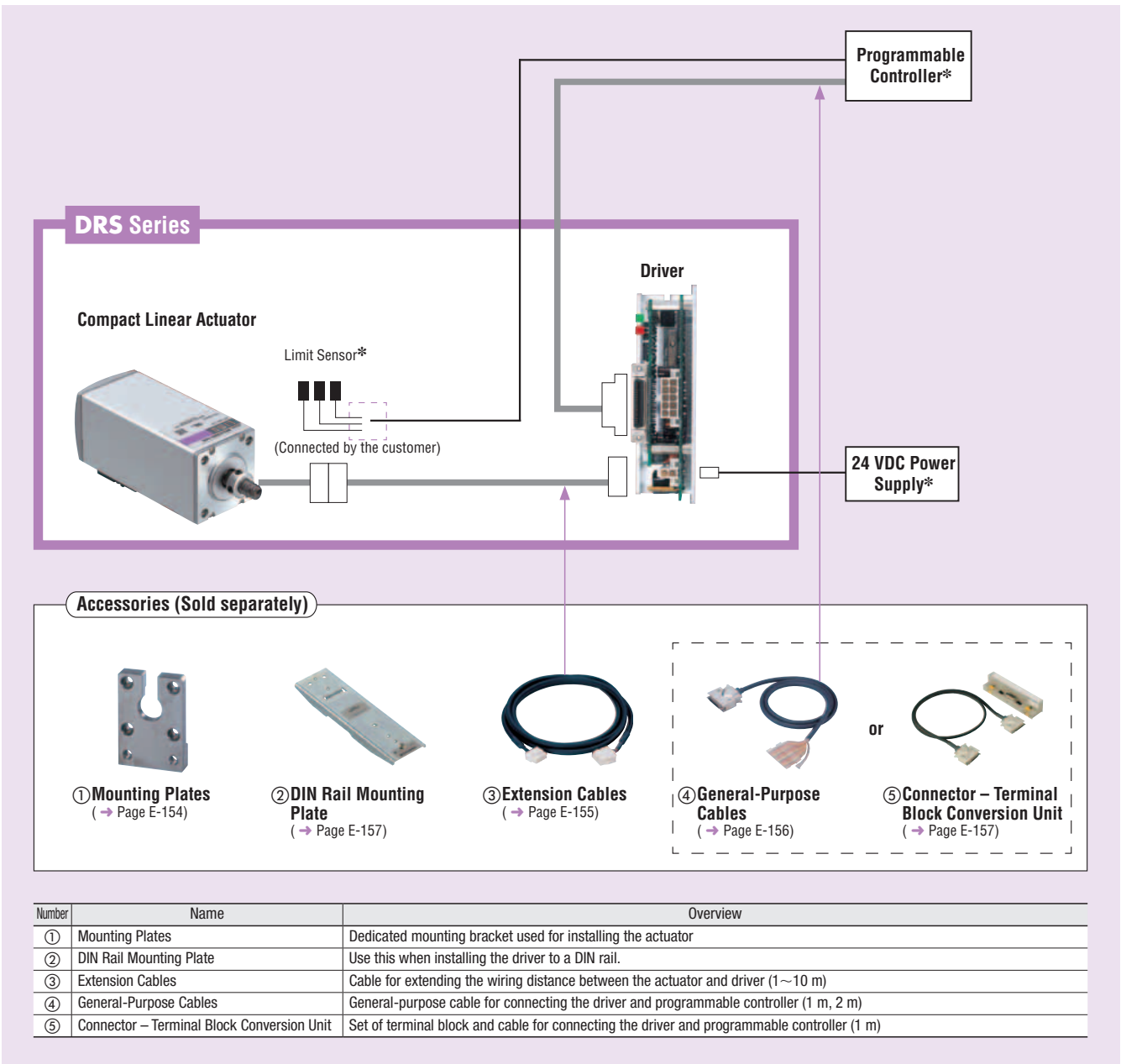
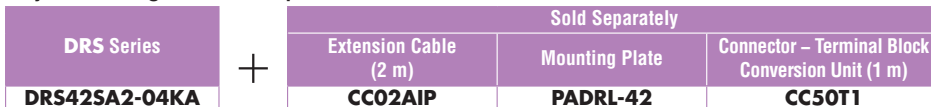


System Configuration

*Not supplied



System Configuration Example



●The system configuration shown above is an example. Other combinations are available.

Product Number Code

DRS 42 S A 2 G - 04 M K A

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

①	Series Name	DRS: DRS Series
②	Frame Size	28: □28 mm 42: □42 mm
③	Motor Type	S: <i>QSTEP</i>
④	Drive System	A: Rolled Ball Screw Type B: Ground Ball Screw Type
⑤	Lead	1: 1 mm 2: 2 mm
⑥	Type	Blank: Standard Type G: Guide Type
⑦	Stroke	03: 30 mm (□28 mm) 04: 40 mm (□42 mm) 06: 60 mm (□28 mm) 10: 100 mm (□42 mm)
⑧	Additional Function	Blank: Without Additional Function M: With Electromagnetic Brake N: With Adjusting Knob
⑨	Power Supply Voltage	K: 24 VDC
⑩	Driver Type	A: DRSD□□A-KA

Product Line

● Rolled Ball Screw Type

Frame Size (mm)	Type	Additional Function	Without Additional Function	With Electromagnetic Brake	With Adjusting Knob
			Product Name	Product Name	Product Name
□28	Standard Type		DRS28SA1-03KA	—	DRS28SA1-03NKA
			DRS28SA1-06KA	—	—
□28	Guide Type		DRS28SA1G-03KA	—	DRS28SA1G-03NKA
			DRS28SA1G-06KA	—	—
□42	Standard Type		DRS42SA2-04KA	DRS42SA2-04MKA	DRS42SA2-04NKA
			DRS42SA2-10KA	—	—
□42	Guide Type		DRS42SA2G-04KA	DRS42SA2G-04MKA	DRS42SA2G-04NKA
			DRS42SA2G-10KA	—	—

● Ground Ball Screw Type

Frame Size (mm)	Type	Additional Function	Without Additional Function	With Electromagnetic Brake	With Adjusting Knob
			Product Name	Product Name	Product Name
□28	Standard Type		DRS28SB1-03KA	—	DRS28SB1-03NKA
			DRS28SB1-06KA	—	—
□28	Guide Type		DRS28SB1G-03KA	—	DRS28SB1G-03NKA
			DRS28SB1G-06KA	—	—
□42	Standard Type		DRS42SB2-04KA	DRS42SB2-04MKA	DRS42SB2-04NKA
			DRS42SB2-10KA	—	—
□42	Guide Type		DRS42SB2G-04KA	DRS42SB2G-04MKA	DRS42SB2G-04NKA
			DRS42SB2G-10KA	—	—

— The following items are included in each product.

Actuator, Surge Suppressor*, Driver, Control I/O Connector, Power Supply Connector, Operating Manual
*Electromagnetic brake type only

Specifications

● Actuator

◇ Standard Type (RoHS)



Product Name	DRS28S□1-03KA DRS28S□1-03NKA DRS28S□1-06KA		DRS42S□2-04KA DRS42S□2-04NKA DRS42S□2-10KA		DRS42S□2-04MKA	
	Without Electromagnetic Brake		Without Electromagnetic Brake		With Electromagnetic Brake	
Electromagnetic Brake						
Maximum Vertical Transportable Mass*1	kg	4	3	15	10	15
Maximum Speed*2	mm/s	~12	~24	~15	~30	~15
Maximum Acceleration	m/s ²	0.2		0.4		0.4
Maximum Thrust Force*3	N	40	30	150	100	150
Maximum Holding Force	Power ON*4	40		150		150
	Power OFF	-		0		-
	Electromagnetic Brake	-		-		150
Repetitive Positioning Accuracy	mm	Rolled Ball Screw Type: ±0.02		Ground Ball Screw Type: ±0.005		
Lost Motion	mm	Rolled Ball Screw Type: 0.1		Ground Ball Screw Type: 0.05		
Resolution*5	mm	0.001		0.002		0.002
Lead	mm	1		2		2
Stroke	mm	03 : 30	06 : 60	04 : 40	10 : 100	40
Mass (With adjusting knob)	kg	0.2 (0.21)		0.6 (0.61)		0.73

◇ Guide Type (RoHS)



Product Name	DRS28S□1G-03KA DRS28S□1G-03NKA		DRS42S□2G-04KA DRS42S□2G-04NKA		DRS42S□2G-04MKA	
	Without Electromagnetic Brake		Without Electromagnetic Brake		With Electromagnetic Brake	
Electromagnetic Brake						
Maximum Horizontal Transportable Mass	kg	3		10		10
Maximum Vertical Transportable Mass*1	kg	3		10		10
Maximum Speed*2	mm/s	~12	~24	~15	~30	~15
Maximum Acceleration	m/s ²	0.2		0.4		0.4
Maximum Thrust Force*3	N	40	30	150	100	150
Maximum Holding Force	Power ON*4	40		150		150
	Power OFF	-		0		-
	Electromagnetic Brake	-		-		150
Maximum Load Moment	N·m	Mr: 0.30	Mv: 0.24	Mr: 1.5	Mr: 1.3	Mv: 1.0
Repetitive Positioning Accuracy	mm	Rolled Ball Screw Type: ±0.02		Ground Ball Screw Type: ±0.005		
Lost Motion	mm	Rolled Ball Screw Type: 0.1		Ground Ball Screw Type: 0.05		
Resolution*5	mm	0.001		0.002		0.002
Lead	mm	1		2		2
Stroke	mm	30		40		40
Mass (With adjusting knob)	kg	0.35 (0.36)		1 (1.01)		1.13

● Either **A** or **B** indicating the drive system is entered where the box □ is located within the product name.

*1 When the power is turned off, or when in an all windings off situation, the actuator loses its thrust force or holding force. As such, it can no longer keep the load in position or withstand an external force.

*2 Use each actuator at or below the following maximum speed in a operating temperature range of 0 to +10°C: **DRS28**: 20 mm/s

*3 The maximum thrust is measured during constant-speed operation in the horizontal direction with no load applied to the moving parts (joint). Thrust force varies with load mass and acceleration.

*4 The holding force is the value when the automatic current cutback function is ON (**DRS28**: 40%, **DRS42**: 50%).

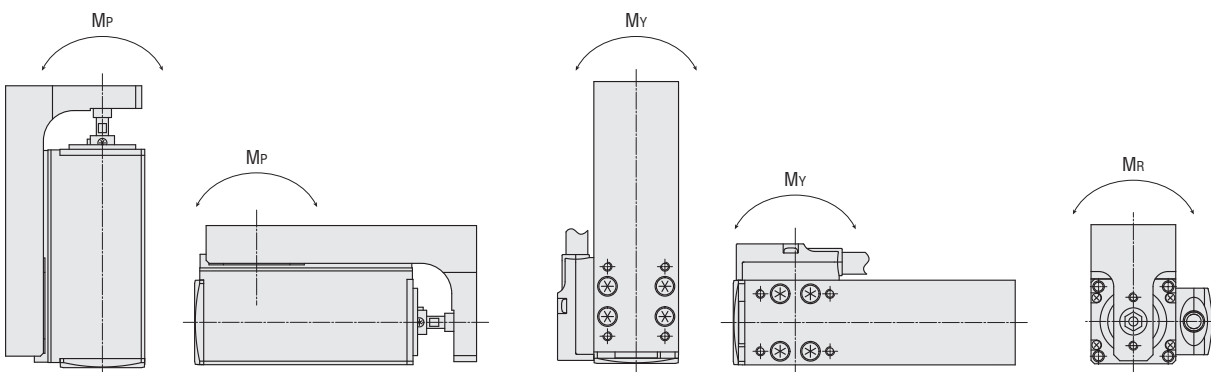
*5 A desired resolution can be set from among four levels.

Note

● Use the actuator in conditions where its surface temperature will not exceed 90°C. The repetitive positioning accuracy is measured at a constant temperature under a constant load.

How to read specifications table → Page E-120

Load Moment



● Electromagnetic Brake

Type of Electromagnetic Brake	Power Off Activated Type
Power Supply Input Voltage/Current	24 VDC ±5% 0.08 A
Brake Activation/Release Time	Activate Time: 20 ms Release Time: 30 ms
Time Rating	Continuous

● Driver

Product Name	DRSD07A-KA	DRSD18A-KA
Power Supply Voltage	24 VDC ±10%	
Input Current	0.8 A	1.6 A
Speed and Positioning Control Command	Pulse Input	
Maximum Input Pulse Frequency	250 kHz (When the pulse duty is 50%)	
Protective Functions	When the protective functions are activated, an alarm signal is output and the motor will coast to a stop. Overload, Overvoltage, Speed Error, Overspeed, EEPROM Data Error, Sensor Error, System Error	
Input Signals	Photocoupler Input, Input Resistance: 220 Ω Input current 7~20 mA Forward (CW) Pulse and Backward (CCW) Pulse (Negative logic pulse input), Pulse and Traveling Direction Switching (Negative logic pulse input), All Windings Off, Alarm Clear, Resolution Select	
Output Signals	Photocoupler and Open-Collector Output External Use Condition: 30 VDC, 15 mA max. (Positioning completion signal, alarm signal, timing signal) Transistor and Open-Collector Output External Use Condition: 30 VDC, 15 mA max. (Feedback pulse A/B-phase signal)	
Mass	0.25 kg	

■ General Specifications

These are the values after rated operation under normal ambient temperature and humidity.

Item	Actuator (Motor)	Driver
Thermal Class	130 (B) [Recognized as 105 (A) under the UL and CSA Standards]	—
Insulation Resistance	The measured value is 100 MΩ min. when a 500 VDC megger is applied between the following places: · Case – Motor and Sensor windings	The measured value is 100 MΩ min. when a 500 VDC megger is applied between the following places: · Heat sink – Power input terminal
Dielectric Strength	No abnormality is judged even with application between the following places for 1 minute: · Case – Motor and sensor windings 0.5 kVAC 50 Hz or 60 Hz	No abnormality is judged even with application between the following places for 1 minute: · Heat sink – Power input terminal 0.5 kVAC 50 Hz or 60 Hz
Operating Environment (In operation)	Ambient Temperature	0~+40°C (non-freezing)
	Ambient Humidity	85% max. (non-condensing)
	Atmosphere	Use in an area without corrosive gases or dust. The product should not be exposed to water, oil or other liquids.

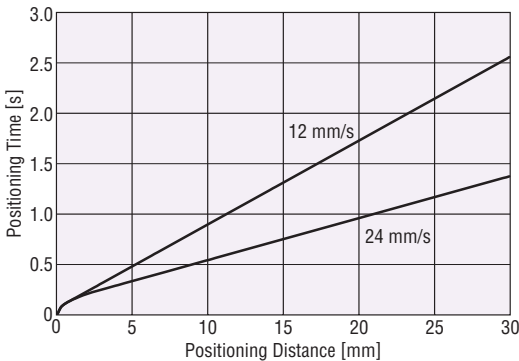
Note

● Do not measure insulation resistance or perform the dielectric strength test while the actuator and driver are connected.

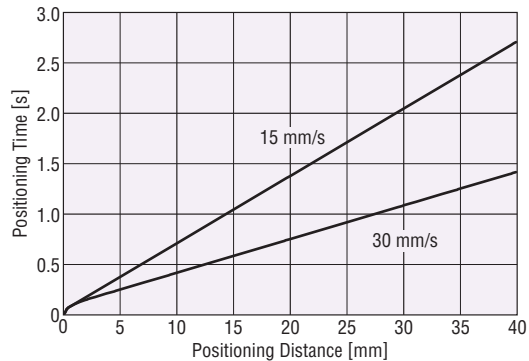
■ Positioning Distance – Positioning Time (Reference)

The positioning time (reference) can be checked from the positioning distance. The graphs below show the characteristics when operated at maximum speed and maximum acceleration. (Velocity Filter: "0")

DRS28



DRS42



● Use each actuator at the following starting speed:

DRS28: 0.2 mm/s or less

DRS42: 0.4 mm/s or less

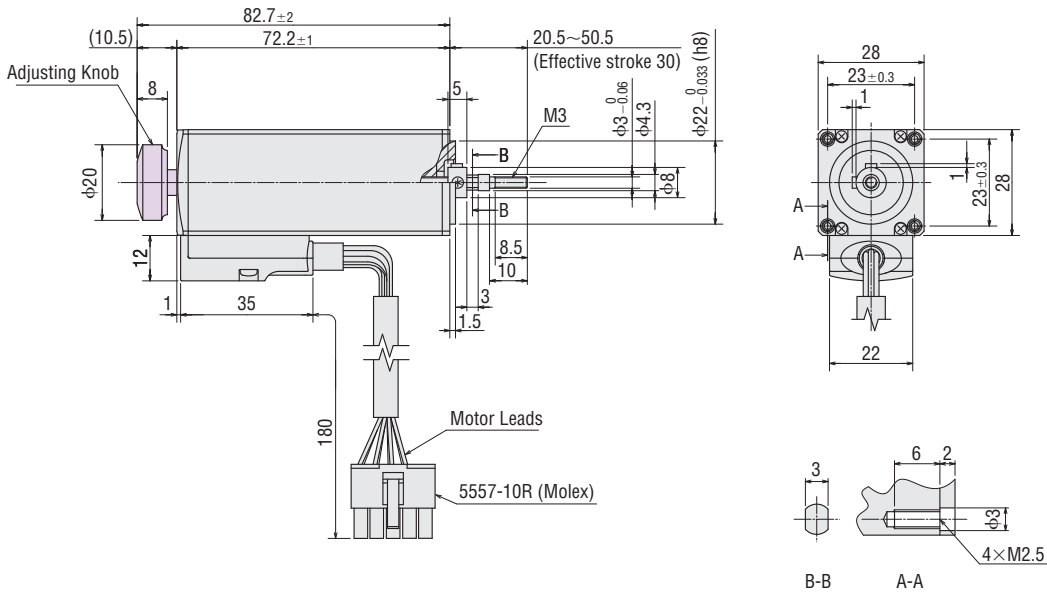
Dimensions (Unit = mm)

● Actuator

◇ Rolled Ball Screw Type Standard Type

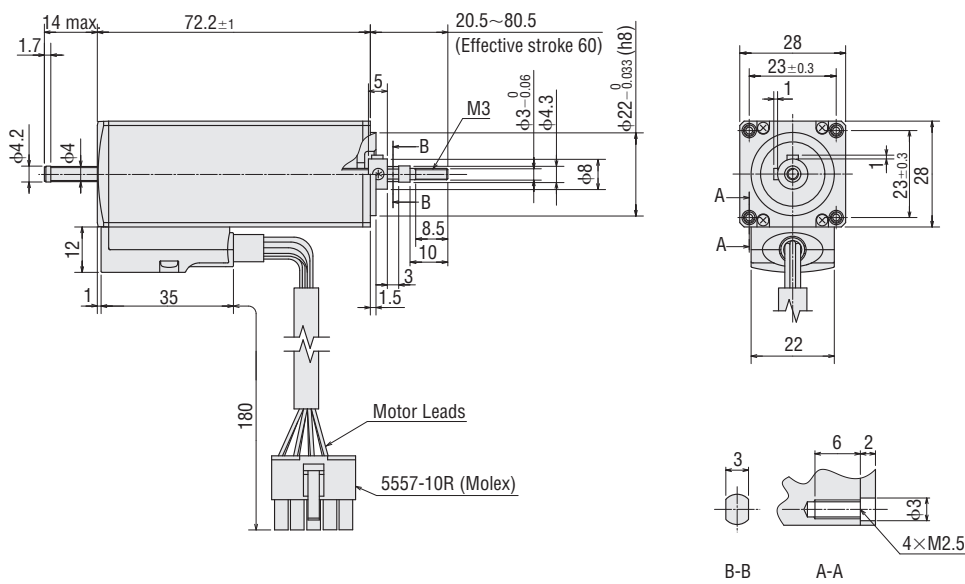
1 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRS28SA1-03KA	DRS28SA1-03K	0.2
DRS28SA1-03NKA	DRS28SA1-03NK	0.21



2 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRS28SA1-06KA	DRS28SA1-06K	0.2

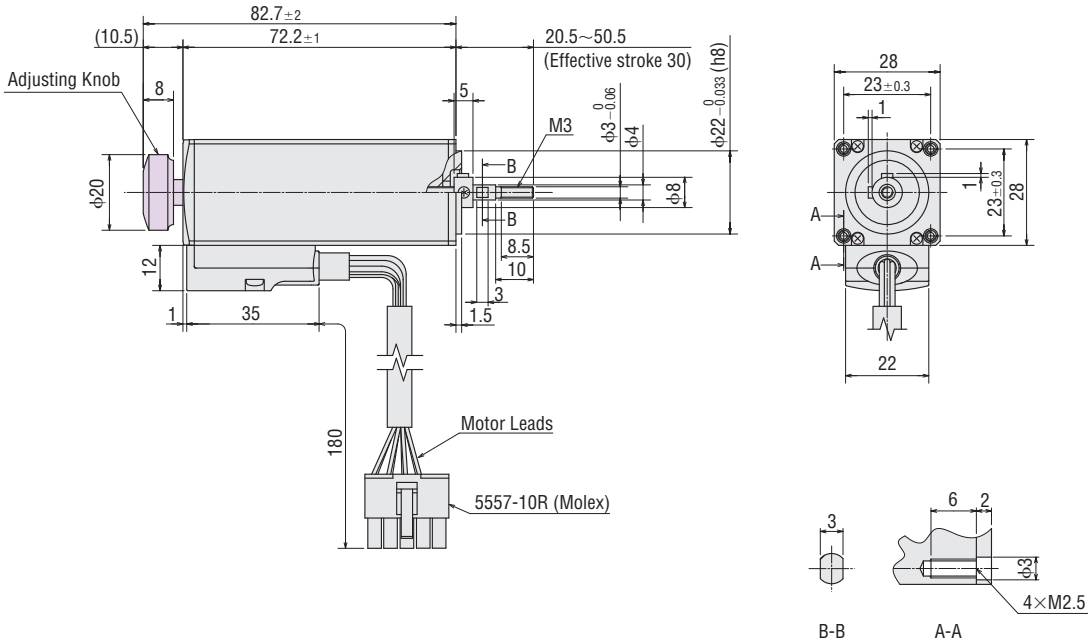


● The dimensions of 1 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in [] areas should be ignored.

◇ Ground Ball Screw Type Standard Type

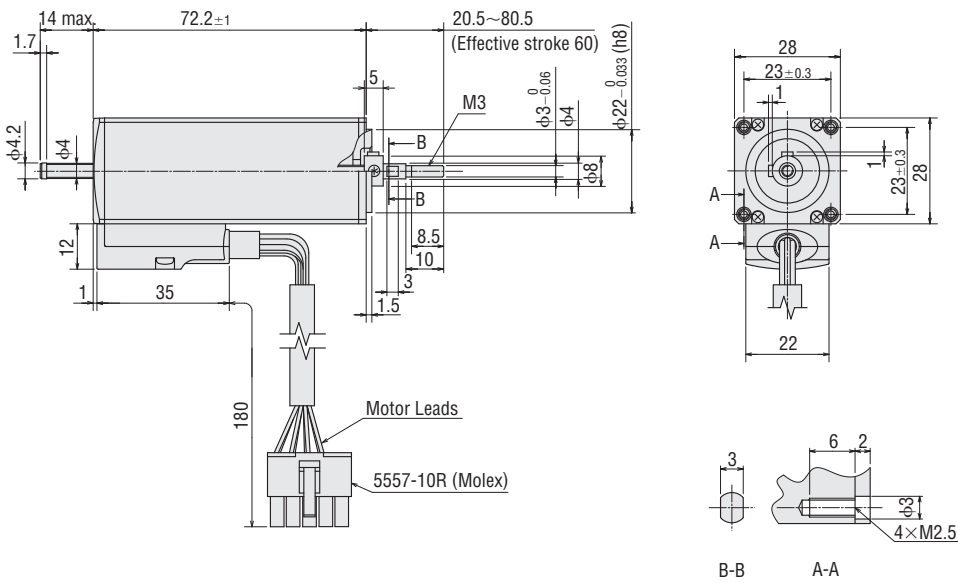
3 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRS28SB1-03KA	DRS28SB1-03K	0.2
DRS28SB1-03NKA	DRS28SB1-03NK	0.21



4 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRS28SB1-06KA	DRS28SB1-06K	0.2

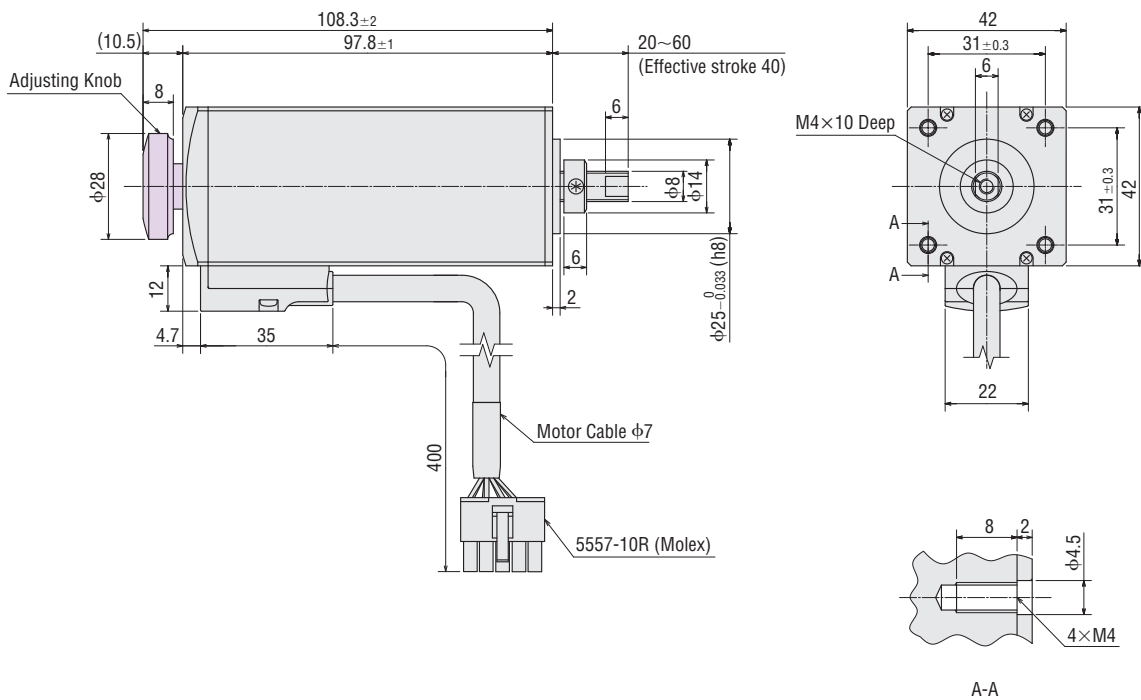


● The dimensions of 3 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in [] areas should be ignored.

◇ Rolled Ball Screw Type/Ground Ball Screw Type Standard Type

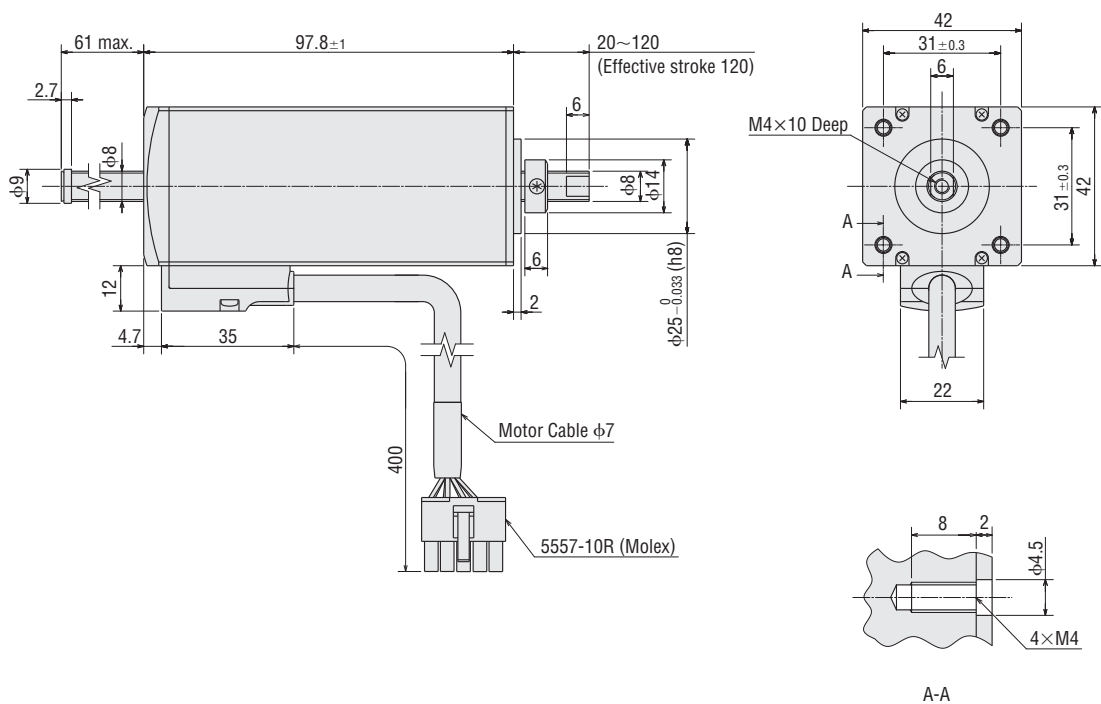
5 Frame Size 42 mm

Product Name	Actuator Product Name	Mass kg
DRS42SA2-04KA	DRS42SA2-04K	0.6
DRS42SB2-04KA	DRS42SB2-04K	0.6
DRS42SA2-04NKA	DRS42SA2-04NK	0.61
DRS42SB2-04NKA	DRS42SB2-04NK	0.61



6 Frame Size 42 mm

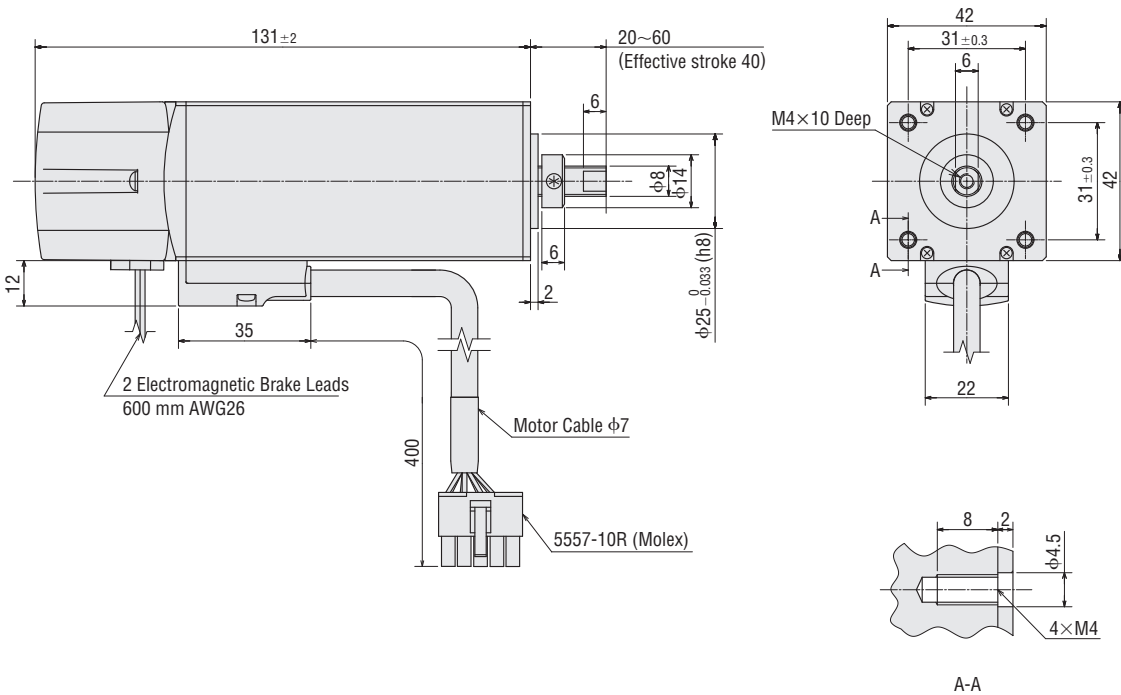
Product Name	Actuator Product Name	Mass kg
DRS42SB2-10KA	DRS42SB2-10K	0.63
DRS42SA2-10KA	DRS42SA2-10K	0.63



● The dimensions of 5 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in [] areas should be ignored.

7 Frame Size 42 mm

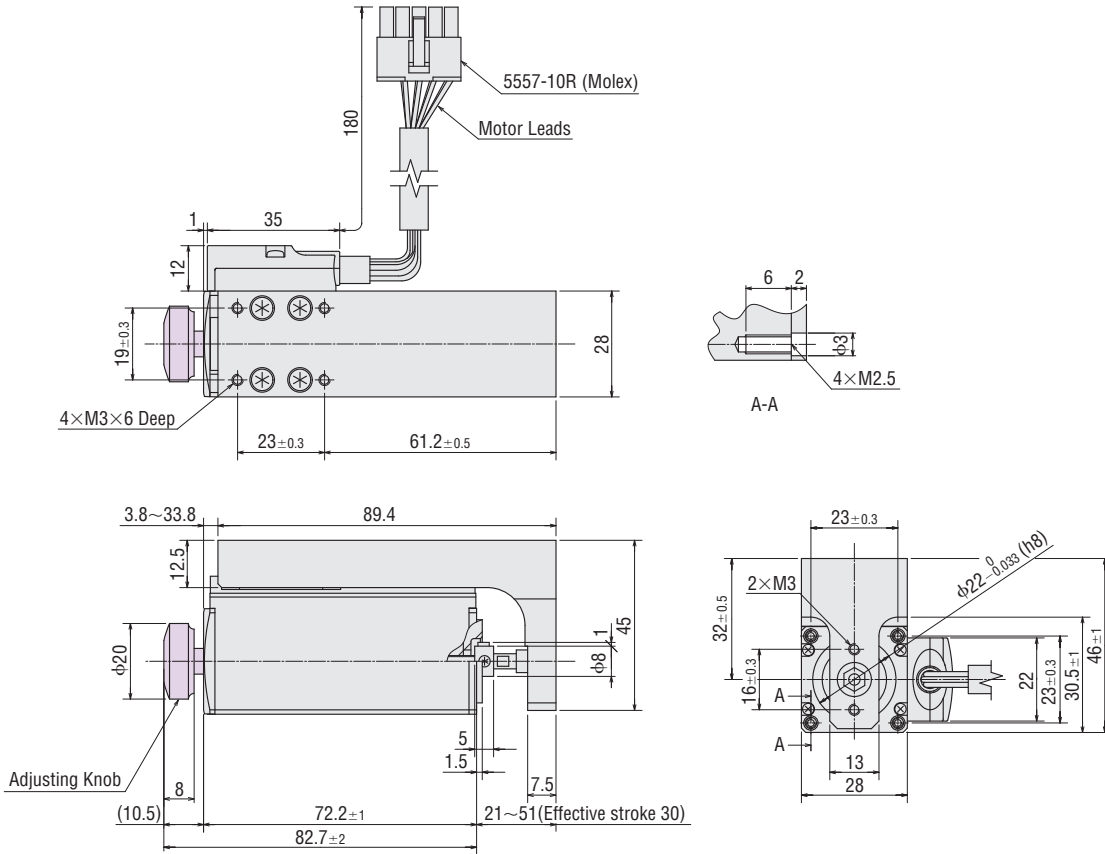
Product Name	Actuator Product Name	Mass kg
DRS42SA2-04MKA	DRS42SA2-04MK	0.73
DRS42SB2-04MKA	DRS42SB2-04MK	0.73



◇ Rolled Ball Screw Type Guide Type

8 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRS28SA1G-03KA	DRS28SA1G-03K	0.35
DRS28SA1G-03NKA	DRS28SA1G-03NK	0.36

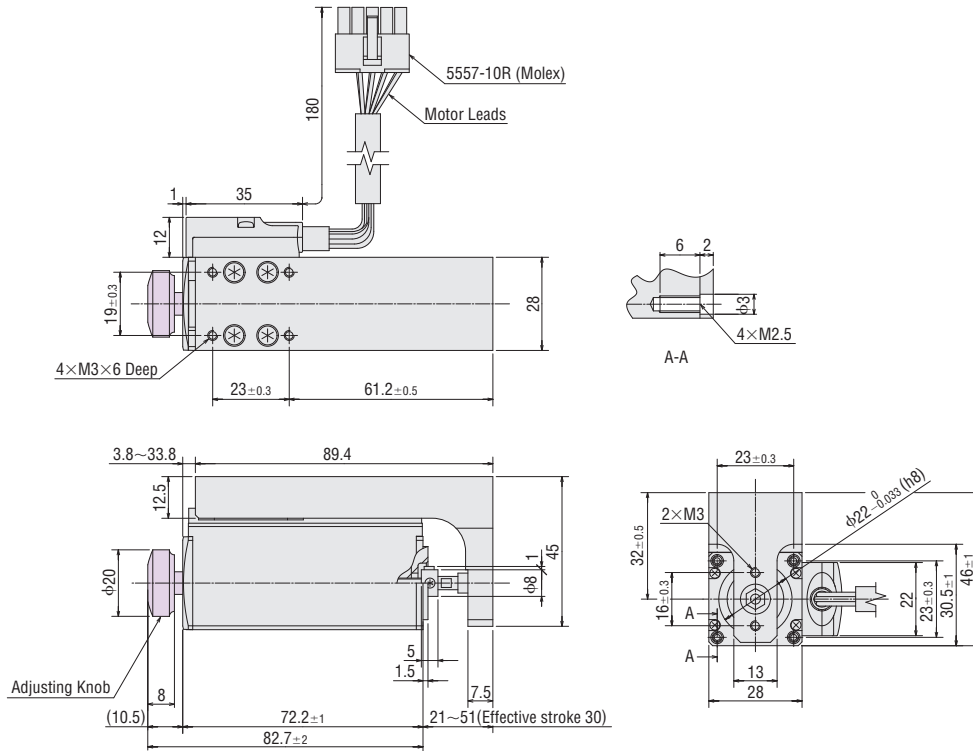


● The dimensions of 8 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in shaded areas should be ignored.

◇ Ground Ball Screw Type Guide Type

9 Frame Size 28 mm

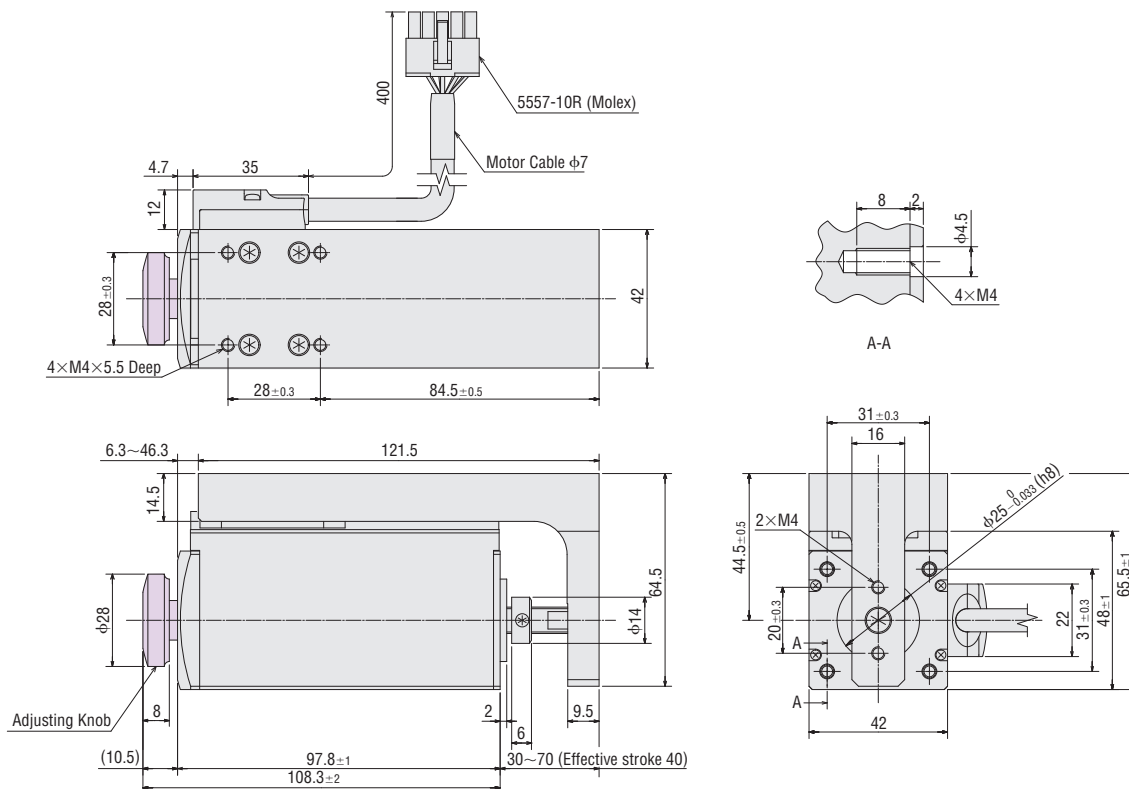
Product Name	Actuator Product Name	Mass kg
DRS28SB1G-03KA	DRS28SB1G-03K	0.35
DRS28SB1G-03NKA	DRS28SB1G-03NK	0.36



◇ Rolled Ball Screw Type/Ground Ball Screw Type Guide Type

10 Frame Size 42 mm

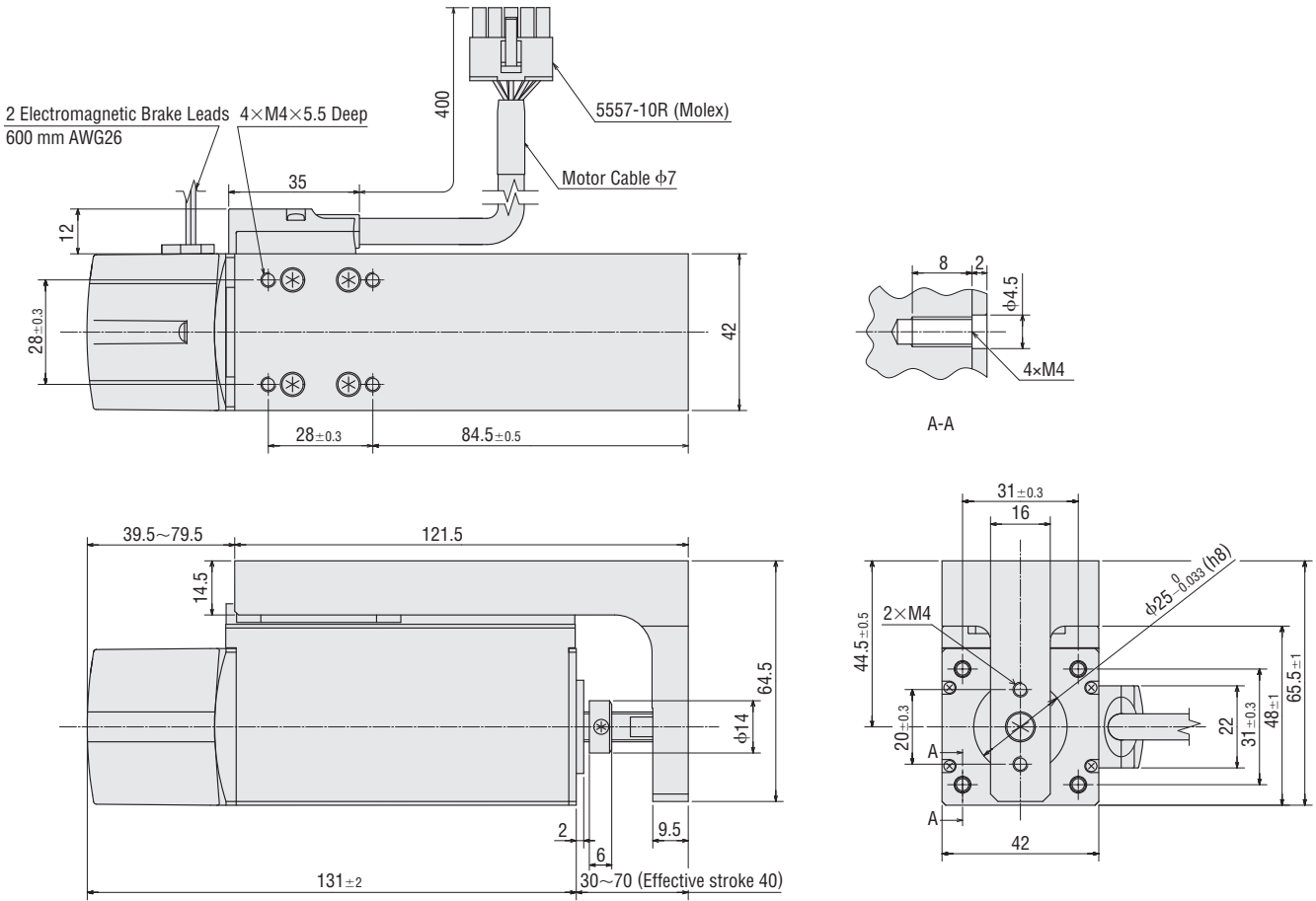
Product Name	Actuator Product Name	Mass kg
DRS42SA2G-04KA	DRS42SA2G-04K	1
DRS42SB2G-04KA	DRS42SB2G-04K	1
DRS42SA2G-04NKA	DRS42SA2G-04NK	1.01
DRS42SB2G-04NKA	DRS42SB2G-04NK	1.01



● The dimensions of 9 and 10 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in shaded areas should be ignored.

11 Frame Size 42 mm

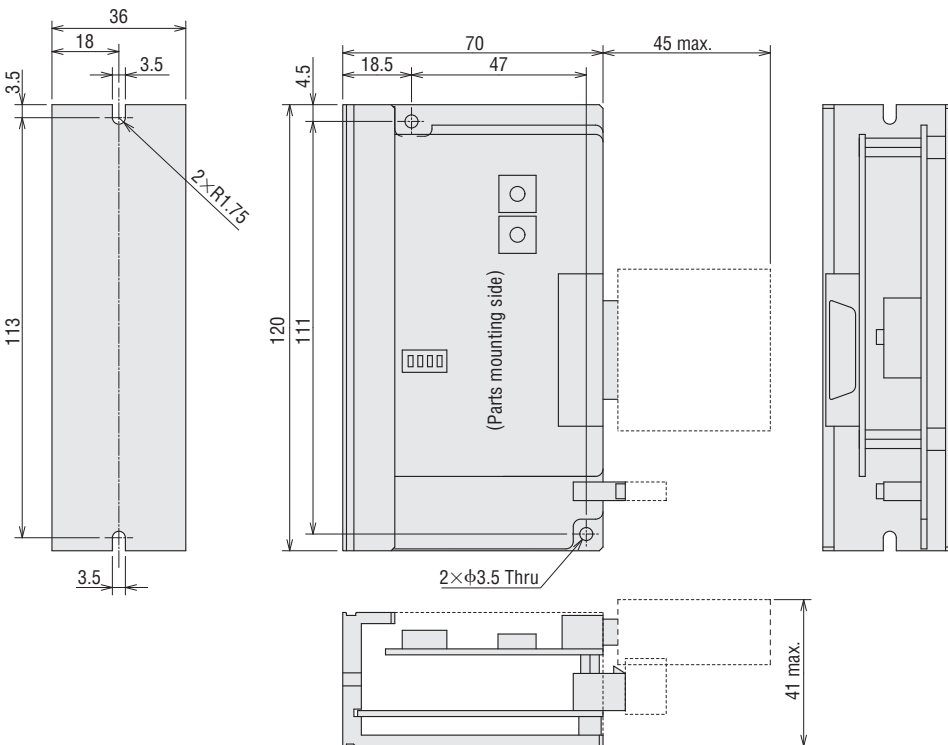
Product Name	Actuator Product Name	Mass kg
DRS42SA2G-04MKA	DRS42SA2G-04MK	1.13



● Driver

12

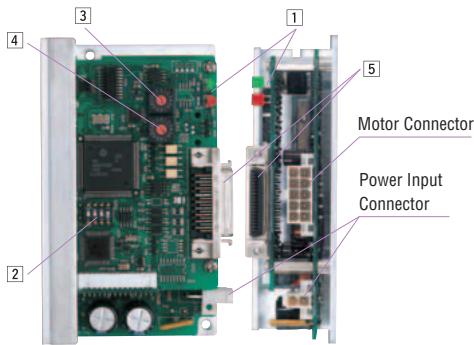
Driver Product Name: DRSD07A-KA, DRSD18A-KA
Mass: 0.25 kg



- Included
- Control I/O Connector
 - Case : 54331-1361 (Molex)
 - Connector : 54306-3619 (Molex)
- Power Supply Connector
 - Connector : 5557-02R (Molex)
 - Connector Crimp
 - Terminal : 5556TL (Molex)

Connection and Operation

Names and Functions of Driver Parts



1 Signal Monitor Display

◇ LED Indicators

Indication	Color	Functions	Lighting Condition
LED1	Green	Power Supply Indication	When power is applied
LED2	Red	Alarm Indication	Blinks when protective functions are activated

◇ Alarm Contents

Blink Count	Functions	Operating Condition
2	Overload Protection	The motor has been operated continuously over 5 seconds under a load exceeding the maximum torque.
3	Overvoltage Protection	The inverter voltage of the driver exceeded the permissible value.
4	Speed Error Protection	The actuator cannot accurately follow at the indicated pulse speed.
6	Overspeed	The set speed is too high.
7	EEPROM Data Error	A parameter has been damaged.
8	Sensor Error	The power source is turned ON when the motor cable is not connected to the driver.
Lighting	System Error	The driver has a fatal error.

2 Function Switches

Indication	Switch Name	Functions																								
SW3 1/2	Resolution Select Switch	This function is for selecting the actuator resolution. Factory Setting: OFF Resolution (Unit: mm) <table border="1"> <thead> <tr> <th>SW3</th> <th>1</th> <th>OFF</th> <th>ON</th> <th>OFF</th> <th>ON</th> </tr> </thead> <tbody> <tr> <td>2</td> <td>OFF</td> <td>OFF</td> <td>ON</td> <td>ON</td> <td>ON</td> </tr> </tbody> </table> <table border="1"> <thead> <tr> <th>Model</th> <th>DRS28</th> <th>0.001</th> <th>0.002</th> <th>0.0001</th> <th>0.0002</th> </tr> </thead> <tbody> <tr> <td>DRS42</td> <td>0.002</td> <td>0.004</td> <td>0.0002</td> <td>0.0004</td> <td></td> </tr> </tbody> </table>	SW3	1	OFF	ON	OFF	ON	2	OFF	OFF	ON	ON	ON	Model	DRS28	0.001	0.002	0.0001	0.0002	DRS42	0.002	0.004	0.0002	0.0004	
SW3	1	OFF	ON	OFF	ON																					
2	OFF	OFF	ON	ON	ON																					
Model	DRS28	0.001	0.002	0.0001	0.0002																					
DRS42	0.002	0.004	0.0002	0.0004																						
SW3 4	Pulse Input Mode Switch	The settings of this switch are compatible with the following two types of pulse input modes: 1P for the 1-pulse input mode 2P for the 2-pulse input mode. (Factory Setting)																								

Note

- Always turn the power OFF before switching resolution or pulse input, and turn it ON again after you have made the change.
- When resolution select switch 2 is set to "ON," the resolution setting will not change even if a resolution select signal is input.

3 Current Adjustment Switch

Indication	Switch Name	Function
SW1	Current Adjustment Switch	The motor running current can be lowered to suppress temperature rise in the actuator and driver, if there is a sufficient margin for motor torque.

4 Velocity Filter Adjustment Switch

Indication	Switch Name	Function
SW2	Velocity Filter Adjustment Switch	This switch is used to make adjustments when a smooth start/stop or smooth motion at low speed operation is required.

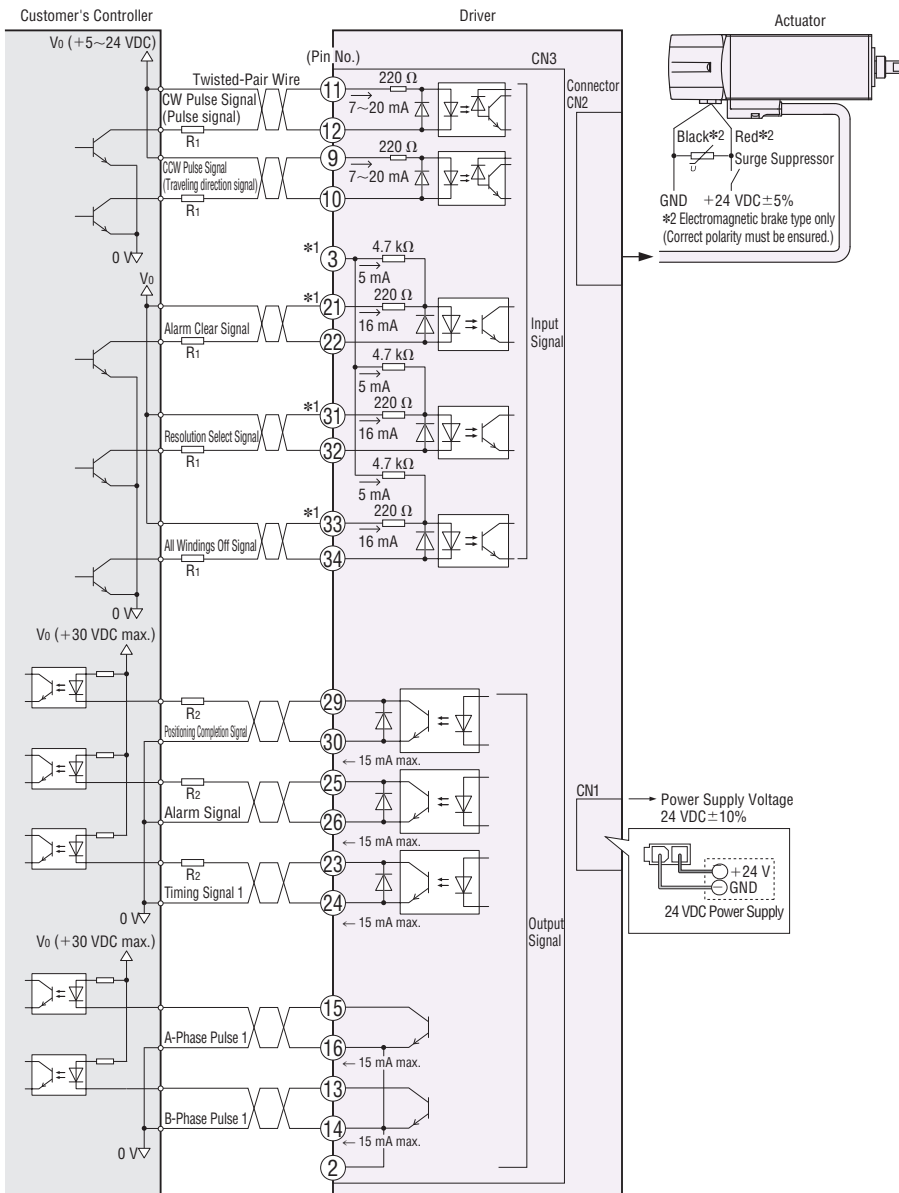
5 I/O Signals

Indication	I/O	Pin No.	Code	Signal Name	
		1	—	—	
External Power Supply Input		2	GND	Power Supply for Signal Control	
		3	Vcc+24 V		
		4	—		
		5	—		
		6	—		
		7	—		
		8	—		
Input		9	CCW (DIR.)	CCW Pulse (Traveling direction)*	
		10	CCW (DIR.)		
		11	CW (PLS)		CW Pulse (Pulse)*
		12	CW (PLS)		
Output		13	BSG1	B-Phase Pulse Output (Open collector)	
		14	GND		
		15	ASG1	A-Phase Pulse Output (Open collector)	
		16	GND		
CN3		17	—	—	
		18	—	—	
		19	—	—	
		20	—	—	
		21	ACL	Alarm Clear	
	22	ACL			
Output		23	TIM.1	Timing (Open collector)	
		24	TIM.1		
		25	ALARM	Alarm	
		26	ALARM		
		27	—	—	
		28	—	—	
Output		29	END	Positioning Completion	
		30	END		
Input		31	×10	Resolution Select	
		32	×10		
		33	C.OFF	All Windings Off	
		34	C.OFF		
		35	—	—	
		36	—	—	

* () indicates the signal name for the setting in 1-pulse input mode.

The initial setting is the 2-pulse input mode.

● Connection Diagram



Notes on Wiring

◇ I/O Signal Connection

- **Input Signal**
The external resistor is not needed when the voltage is 5 VDC. If voltage exceeding 5 VDC is applied, connect an external resistor R₁ so that the current becomes 7 to 20 mA.
Example: V_o is 24 VDC, R₁: 1.5 to 2.2 kΩ 0.5 W or more
- *1 Pin ③ becomes +COM when the alarm clear signal, resolution select signal and all windings off signal are used at 24 VDC. Connect +24 VDC to pin ③ and do not connect anything to pins ②, ③ or ③.
- **Output Signal**
Check the specifications of all devices to be connected and if the current will exceed 15 mA, connect an external resistor R₂.
- Use a twisted-pair wire of AWG28 to 24 (0.08 to 0.2 mm²).
- Since the maximum transmissible frequency drops as the pulse line becomes longer, keep the wiring length as short as possible (within 2 m). Technical reference → Page G-46
- Provide a distance of 300 mm or more between the I/O signal lines and power lines (power supply lines, motor lines, etc.).

◇ Power Connection

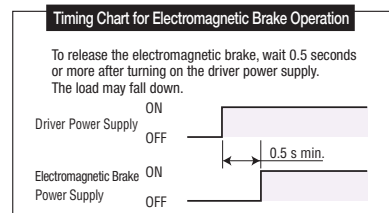
- Use wires of AWG20 to 18 (0.5 to 0.75 mm²).
- Incorrect polarities of the DC power supply input will lead to driver damage. Make sure that the polarity is correct before turning power on.

◇ Extension of Motor Cable

To extend the wiring distance between the actuator and driver, use an extension cable (sold separately). The wiring distance can be extended to a maximum of 10 m.

◇ Connecting the Electromagnetic Brake

- Use a shielded cable of AWG24 (0.2 mm²) or thicker.
- Use power supplies of 24 VDC ±0.1 A or more for electromagnetic brakes.
- Connect the red lead wire from the actuator to the +24 VDC terminal on the DC power supply and the black lead wire to the GND terminal on the DC power supply.
- Correct polarity (+ and -) must be ensured when connecting the electromagnetic brake lead wires to the DC power supply. If polarity is incorrect, the electromagnetic brake will not operate.
- Keep the wiring distance as short as possible to suppress noise.
- To protect the switch contacts and prevent noise, always connect a surge suppressor (included).



◇ General

- A separate hand crimp tool is required to crimp the supplied power connector and lead wire.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

Actuator and Driver Combinations

Product names for actuator and driver combination products are shown below.

● Rolled Ball Screw Type

Frame Size (mm)	Type	Additional Functions	Product Name	Actuator Product Name	Driver Product Name
□28	Standard Type	Without Additional Function	DRS28SA1-03KA	DRS28SA1-03K	DRSD07A-KA
			DRS28SA1-06KA	DRS28SA1-06K	
		With Adjusting Knob	DRS28SA1-03NKA	DRS28SA1-03NK	
	Guide Type	Without Additional Function	DRS28SA1G-03KA	DRS28SA1G-03K	
			DRS28SA1G-03NKA	DRS28SA1G-03NK	
		With Adjusting Knob	DRS28SA1G-03NKA	DRS28SA1G-03NK	
□42	Standard Type	Without Additional Function	DRS42SA2-04KA	DRS42SA2-04K	DRSD18A-KA
			DRS42SA2-10KA	DRS42SA2-10K	
		With Electromagnetic Brake	DRS42SA2-04MKA	DRS42SA2-04MK	
	Guide Type	With Adjusting Knob	DRS42SA2-04NKA	DRS42SA2-04NK	
		Without Additional Function	DRS42SA2G-04KA	DRS42SA2G-04K	
		With Electromagnetic Brake	DRS42SA2G-04MKA	DRS42SA2G-04MK	
	With Adjusting Knob	DRS42SA2G-04NKA	DRS42SA2G-04NK		

● Ground Ball Screw Type

Frame Size (mm)	Type	Additional Functions	Product Name	Actuator Product Name	Driver Product Name
□28	Standard Type	Without Additional Function	DRS28SB1-03KA	DRS28SB1-03K	DRSD07A-KA
			DRS28SB1-06KA	DRS28SB1-06K	
		With Adjusting Knob	DRS28SB1-03NKA	DRS28SB1-03NK	
	Guide Type	Without Additional Function	DRS28SB1G-03KA	DRS28SB1G-03K	
			DRS28SB1G-03NKA	DRS28SB1G-03NK	
		With Adjusting Knob	DRS28SB1G-03NKA	DRS28SB1G-03NK	
□42	Standard Type	Without Additional Function	DRS42SB2-04KA	DRS42SB2-04K	DRSD18A-KA
			DRS42SB2-10KA	DRS42SB2-10K	
		With Electromagnetic Brake	DRS42SB2-04MKA	DRS42SB2-04MK	
	Guide Type	With Adjusting Knob	DRS42SB2-04NKA	DRS42SB2-04NK	
		Without Additional Function	DRS42SB2G-04KA	DRS42SB2G-04K	
		With Electromagnetic Brake	DRS42SB2G-04MKA	DRS42SB2G-04MK	
	With Adjusting Knob	DRS42SB2G-04NKA	DRS42SB2G-04NK		

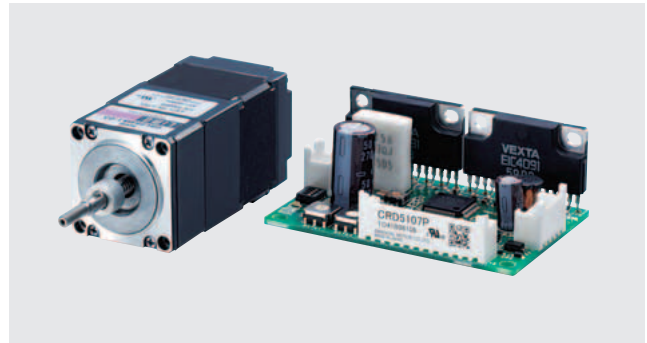
Compact Linear Actuators DRL Series

● Connection Information ●
 Technical reference → Page G-1
 Safety standards → Page H-2

In the compact linear actuator **DRL Series**, the drive mechanism adopts a 5-phase stepping motor with ball screw. This series achieves highly accurate positioning in a space saving design.



● For detailed product safety standard information including standards, file number and certification body, please visit www.orientalmotor.eu.



Features

● Compact Design and High Positioning Accuracy

The actuator size was reduced through unique ideas that a motor manufacturer can generate. Using the original technology of Oriental Motor, the compact and lightweight body houses the linear motion mechanism as well as the rotating parts of the stepping motor. The **DRL Series** helps to achieve a significant reduction in the size of your equipment and system.

● Lineup of Rolled Ball Screw Type and Ground Ball Screw Type

Rolled Ball Screw Type Repetitive Positioning Accuracy: ± 0.02 mm

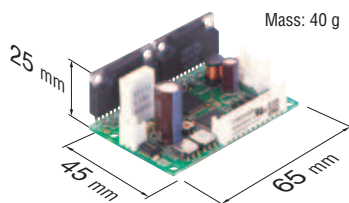
Ground Ball Screw Type Repetitive Positioning Accuracy: ± 0.005 mm

● If you are interested in the ground ball screw type, please contact the nearest Oriental Motor sales office.

● Compact DC Input Board Driver Meeting the Space-Saving Needs

The compact, lightweight driver implements microstep drive. A new IC allows the driver to provide various functions.

- Smooth Drive Function
- 1-Pulse/2-Pulse Input Mode Switching
- 25 Microstep Drive Resolution Settings are Available
- Power Input Indicator LED
- Photocoupler Input
- Connector with Safety Lock (by Molex)
- Conforms to Safety Standards



◇ Compact Microstep Driver

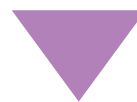
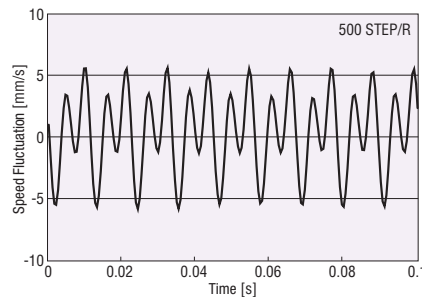
The microstep drive system allows you to set high resolutions up to 1/250 of the basic resolution of the actuator. This function is effective in meeting your low vibration and low noise operation needs at low speeds. The high-performance driver is also compact and lightweight, achieving a reduction of approximately 45% in size compared with a conventional full-step type driver.

● Low Vibration with the Smooth Drive Function

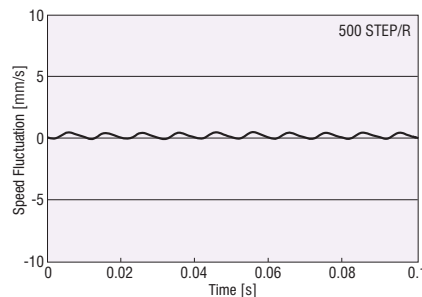
The smooth drive function automatically implements microstep drive based on the same travel amount and speed used in the full step mode, without changing the pulse input settings. This function is particularly useful when the system is operated in the full step or half step mode.

● Comparison of Speed Fluctuation

Smooth Drive Function: OFF



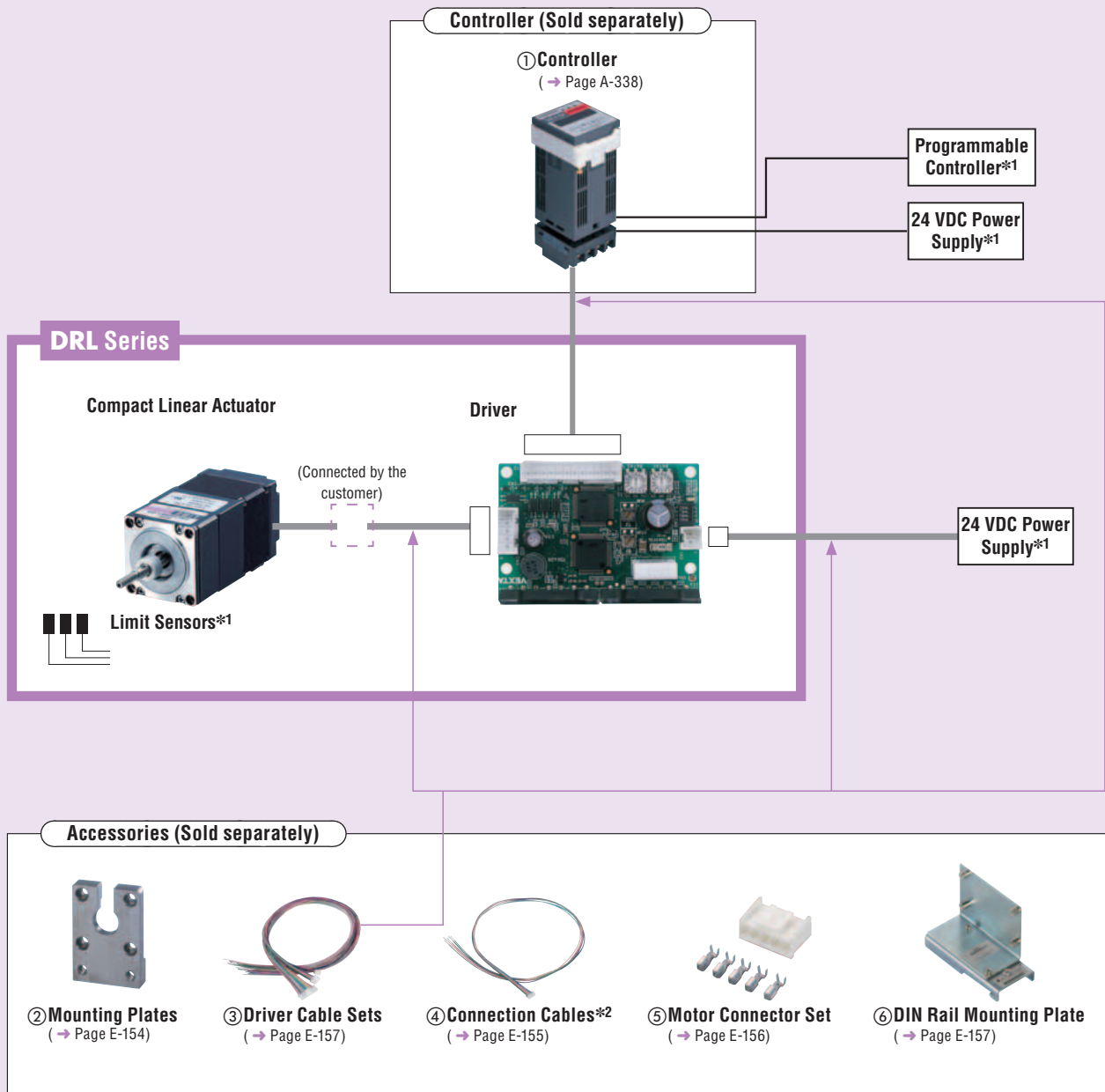
Smooth Drive Function: ON



System Configuration

An example of a single-axis system configuration with the **SG8030JY** controller is shown below.

*1 Not supplied



*2 A connection cable of 0.6 m is included with the **DRL20** motor and driver package.

Number	Name	Overview
①	Controller	This controller gives commands needed to drive the actuator.
②	Mounting Plates	Dedicated mounting bracket used for installing the actuator.
③	Driver Cable Sets	Cables for connecting the driver and motor, DC power supply or programmable controller (0.6 m).
④	Connection Cables	Lead wire with a connector crimped for connector-coupled actuators (0.6 m, 1 m).
⑤	Motor Connector Set	Set of connector housings and contacts for use with connector-coupled actuators (for 30 units).
⑥	DIN Rail Mounting Plate	Use this when installing the driver to a DIN rail.

System Configuration Example

DRL Series	+	Sold Separately		
		Controller	Driver Cable Set (0.6 m)	Mounting Plate
DRL28PA1-03G		SG8030JY-U	LCS04SD5	PADRL-28

● The system configuration shown above is an example. Other combinations are available.

Product Number Code

DRL 60 P A 4 - 05 M G

① ② ③ ④ ⑤ ⑥ ⑦ ⑧ ⑨

①	Series Name	DRL: DRL Series
②	Frame Size	20: □20 mm 28: □28 mm 42: □42 mm 60: □60 mm
③	Motor Type	P: Standard Motor
④	Drive System	A: Rolled Ball Screw Type B: Ground Ball Screw Type
⑤	Lead	1: 1 mm (□20 mm, 28 mm) 2: 2 mm (□42 mm) 4: 4 mm (□60 mm)
⑥	Type	Blank: Standard Type G: Guide Type
⑦	Stroke	02: 25 mm (□20 mm) 03: 30 mm (□28 mm) 04: 40 mm (□42 mm) 05: 50 mm (□60 mm) 06: 60 mm (□28 mm) 10: 100 mm (□42 mm, □60 mm)
⑧	Additional Function	Blank: Without Additional Function M: With Electromagnetic Brake N: With Adjusting Knob
⑨	Driver Type	G: CRD Driver

Product Line

● Rolled Ball Screw Type

Frame Size (mm)	Type	Additional Function		
		Without Additional Function Product Name	With Electromagnetic Brake Product Name	With Adjusting Knob Product Name
□28	Standard Type	DRL28PA1-03G DRL28PA1-06G	—	DRL28PA1-03NG —
	Guide Type	DRL28PA1G-03G	—	DRL28PA1G-03NG
□42	Standard Type	DRL42PA2-04G DRL42PA2-10G	DRL42PA2-04MG —	DRL42PA2-04NG —
	Guide Type	DRL42PA2G-04G	DRL42PA2G-04MG	DRL42PA2G-04NG
□60	Standard Type	DRL60PA4-05G DRL60PA4-10G	DRL60PA4-05MG —	DRL60PA4-05NG —
	Guide Type	DRL60PA4G-05G	DRL60PA4G-05MG	DRL60PA4G-05NG

● Ground Ball Screw Type

Frame Size (mm)	Type	Additional Function		
		Without Additional Function Product Name	With Electromagnetic Brake Product Name	With Adjusting Knob Product Name
□20	Standard Type	DRL20PB1-02G	—	DRL20PB1-02NG
	Guide Type	DRL20PB1G-02G	—	DRL20PB1G-02NG
□28	Standard Type	DRL28PB1-03G DRL28PB1-06G	—	DRL28PB1-03NG —
	Guide Type	DRL28PB1G-03G	—	DRL28PB1G-03NG
□42	Standard Type	DRL42PB2-04G DRL42PB2-10G	DRL42PB2-04MG —	DRL42PB2-04NG —
	Guide Type	DRL42PB2G-04G	DRL42PB2G-04MG	DRL42PB2G-04NG
□60	Standard Type	DRL60PB4-05G DRL60PB4-10G	DRL60PB4-05MG —	DRL60PB4-05NG —
	Guide Type	DRL60PB4G-05G	DRL60PB4G-05MG	DRL60PB4G-05NG

The following items are included in each product.

Actuator, Driver, Driver Connector, Connection Cable*1, Surge Suppressor*2, Operating Manual

*1 Only for **DRL20**

*2 Electromagnetic brake type only

Specifications

● Actuator

◇ Standard Type (RoHS)



Product Name	Without Additional Function		DRL20PB1-02G	DRL28P□1-03G	DRL42P□2-04G	DRL60P□4-05G
	With Adjusting Knob		—	DRL28P□1-06G	DRL42P□2-10G	DRL60P□4-10G
	With Electromagnetic Brake		DRL20PB1-02NG	DRL28P□1-03NG	DRL42P□2-04NG	DRL60P□4-05NG
Maximum Vertical Transportable Mass*1	kg		1.5	3	10	30
Maximum Speed*2	mm/s		20	24	30	32
Maximum Acceleration	m/s ²		0.2	0.2	0.4	0.26
Maximum Thrust Force*3	N		15	30	100	300
Maximum Holding Force	Power ON*4	N	15	30	100	300
	Power OFF	N	0	0	0	0
	Electromagnetic Brake	N	—	—	100	300
Repetitive Positioning Accuracy	mm		±0.005	Rolloed Ball Screw: ±0.02 Ground Ball Screw: ±0.005		
Lost Motion	mm		0.05	Rolloed Ball Screw: 0.1 Ground Ball Screw: 0.05		
Resolution*5	mm		0.002	0.002	0.004	0.008
Lead	mm		1	1	2	4
Stroke	mm		25	03: 30 06: 60	04: 40 10: 100	05: 50 10: 100
Mass	Without Additional Function	kg	0.08	0.18	0.6	1.3
	With Adjusting Knob	kg	0.08	0.19	0.6	1.35
	With Electromagnetic Brake	kg	—	—	0.8	1.7

◇ Guide Type (RoHS)



Product Name	Without Additional Function		DRL20PB1G-02G	DRL28P□1G-03G	DRL42P□2G-04G	DRL60P□4G-05G
	With Adjusting Knob		DRL20PB1G-02NG	DRL28P□1G-03NG	DRL42P□2G-04NG	DRL60P□4G-05NG
	With Electromagnetic Brake		—	—	DRL42P□2G-04MG	DRL60P□4G-05MG
Maximum Horizontal Transportable Mass (Fig. A)	kg		0.5	1	2	3
Maximum Vertical Transportable Mass (Fig. B)*1	kg		1	1.5	5	15
Maximum Speed*2	mm/s		20	24	30	32
Maximum Acceleration	m/s ²		0.2	0.2	0.4	0.26
Maximum Thrust Force*3	N		15	30	100	300
Maximum Holding Force	Power ON*4	N	15	30	100	300
	Power OFF	N	0	0	0	0
	Electromagnetic Brake	N	—	—	100	300
Maximum Load Moment	N·m		M _p : 0 M _v : 0 M _r : 0	M _p : 0 M _v : 0 M _r : 0	M _p : 0.5 M _v : 0.25 M _r : 0.8	M _p : 0.6 M _v : 0.35 M _r : 2.2
Repetitive Positioning Accuracy	mm		①±0.005 ②±0.01	±0.02 (①±0.005 ②±0.02)*6	±0.02 (①±0.005 ②±0.01)*6	
Lost Motion	mm		0.05	Rolloed Ball Screw: 0.1 Ground Ball Screw: 0.05		
Resolution*5	mm		0.002	0.002	0.004	0.008
Lead	mm		1	1	2	4
Stroke	mm		25	30	40	50
Mass	Without Additional Function	kg	0.14	0.25	0.8	1.8
	With Adjusting Knob	kg	0.15	0.26	0.8	1.85
	With Electromagnetic Brake	kg	—	—	1	2.2

● Either **A** or **B** indicating the drive system is entered where the box □ is located within the product name.

*1 When the power is turned off, or when in an all windings off situation, the actuator loses its thrust force or holding force. As such, it can no longer keep the load in position or withstand an external force.

*2 Use each actuator at or below the following maximum speed in an operating temperature range of 0 to +10°C: **DRL20**: 13 mm/s, **DRL28**: 15 mm/s, **DRL42**: 20 mm/s, **DRL60**: 24 mm/s.

*3 The maximum thrust force is measured during constant-speed operation in the horizontal direction with no load applied to the moving parts (screw shaft and joint). Thrust force varies with load mass and acceleration.

*4 The maximum holding force at excitation is the value when the automatic current cutback function is ON (Standstill Current: 50% of the rated current).

*5 Twenty-five resolutions can be set.

*6 These values are for the ground ball screw type.

Note

● Use the actuator in conditions where its surface temperature will not exceed 90°C. The repetitive positioning accuracy is measured at a constant temperature under a constant load.

How to read specifications table → Page E-120

● Maximum Transportable Mass

Figure A

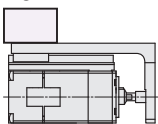
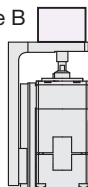
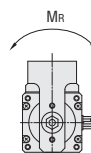
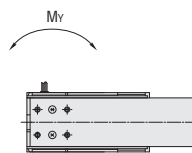
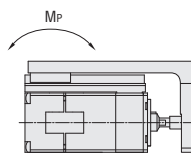


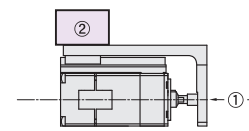
Figure B



● Load Moment



● Repetitive Positioning Accuracy



① Repetitive positioning accuracy is measured at the tip of the guide. ② Repetitive positioning accuracy is measured on the linear guide.

If footnote ① or ② is not indicated, then the accuracy values are identical.

● Electromagnetic Brake

Type of Electromagnetic Brake	Power Off Activated Type
Power Supply Input Voltage/Current	DRL42 : 24 VDC±5% 0.08 A DRL60 : 24 VDC±5% 0.25 A
Brake Activation/Release Time	Activate Time: 20 ms Release Time: 30 ms
Time Rating	Continuous

● Driver

Driver Product Name		CRD5103P	CRD5107P	CRD5114P
Power Supply Input Voltage	Current	24 VDC±10%		
Power Supply Input Current		0.7 A	1.4 A	2.5 A
Input Signals	Input Mode	Photocoupler Input, Input Resistance 220 Ω, Input Current 7~20 mA, Photocoupler "ON": +4.5~5.25 V, Photocoupler "OFF": 0~1 V (Voltage between terminals)		
	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (CW direction operation command signal at 2-pulse input mode), Negative Logic Pulse Input Pulse Width 1 μs min., Pulse Rise and Fall Time 2 μs max., Pulse Duty 50% max. The screw shaft moves one step forward when the pulse input is switched from "ON" → "OFF." Maximum Input Pulse Frequency: 500 kHz (when the pulse duty is 50%)		
	Traveling Direction Signal (CCW Pulse Signal)	Traveling direction signal, Photocoupler ON: CW, Photocoupler OFF: CCW, (CCW direction operation command signal at 2-pulse input mode), Negative Logic Pulse Input Pulse Width 1 μs min., Pulse Rise and Fall Time 2 μs max., Pulse Duty 50% max. The screw shaft moves one step backward when the pulse input is switched from "ON" → "OFF." Maximum Input Pulse Frequency: 500 kHz (when the pulse duty is 50%)		
	Resolution Select Signal	Resolution specified in DATA1 when photocoupler "OFF;" resolution specified in DATA2 when photocoupler "ON"		
	All Windings OFF Signal	When the signal is photocoupler "ON," the output current to the actuator is cut off. When the signal is photocoupler "OFF," the output current is supplied to the actuator.		
	Current Cutback Release Signal	When the signal is photocoupler "ON," the automatic current cutback function at actuator standstill is released. When the signal is photocoupler "OFF," the automatic current cutback function is activated after actuator stops (approximately 100 ms).		
Output Signal	Output Mode	Photocoupler and Open-Collector Output External Use Condition: 24 VDC 10 mA max.		
	Excitation Timing Signal	This signal is output when the excitation sequence is at STEP "0." (Photocoupler: ON) Resolution 1: Signal is output once every 10 pulses Resolution 10: Signal is output once every 100 pulses		
Functions	Automatic Current Cutback, Resolution Select, Pulse Input Mode Switch, Smooth Drive Function, All Windings Off, Excitation Timing			
Cooling Method	Natural Cooling Method			
Mass	0.04 kg			

■ General Specifications

This is the value after rated operation under normal ambient temperature and humidity.

Specifications	Actuator	Driver (24 VDC input)
Motor Thermal Class	130 (A) [Recognized as 105 (A) under the UL and CSA Standards]	—
Insulation Resistance	The measured value is 100 MΩ min. when a 500 VDC megger is applied between the motor windings and the case.	—
Dielectric Strength	No abnormality is judged even with the following application between the motor windings and the case for 1 minute: <ul style="list-style-type: none"> • DRL20, DRL28 0.5 kVAC 50 Hz or 60 Hz • DRL42 1.0 kVAC 50 Hz or 60 Hz • DRL60 1.5 kVAC 50 Hz or 60 Hz 	—
Operating Environment (In operation)	Ambient Temperature	0~+40°C (non-freezing)
	Ambient Humidity	85% max. (non-condensing)
	Atmosphere	Use in an area without corrosive gases or dust. The product should not be exposed to water, oil or other liquids.

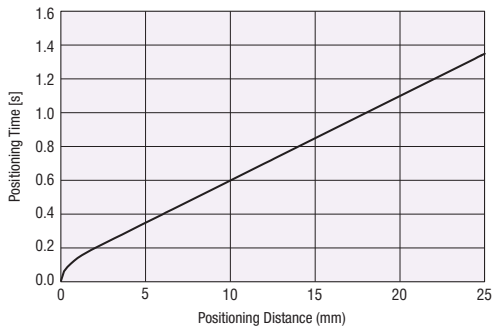
Note

● Do not measure insulation resistance or perform the dielectric strength test while the actuator and driver are connected.

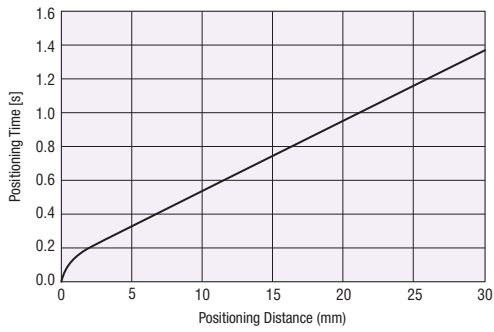
Positioning Distance – Positioning Time (Reference)

The positioning time (reference) can be checked from the positioning distance. The graphs below show the characteristics when operated at maximum speed and maximum acceleration.

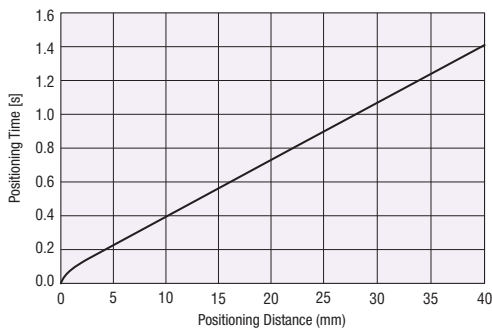
DRL20



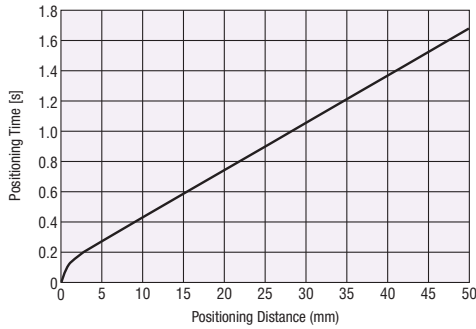
DRL28



DRL42



DRL60



● Use each actuator at the following starting speed:

DRL20, DRL28 : 0.2 mm/s or less

DRL42 : 0.4 mm/s or less

DRL60 : 0.8 mm/s or less

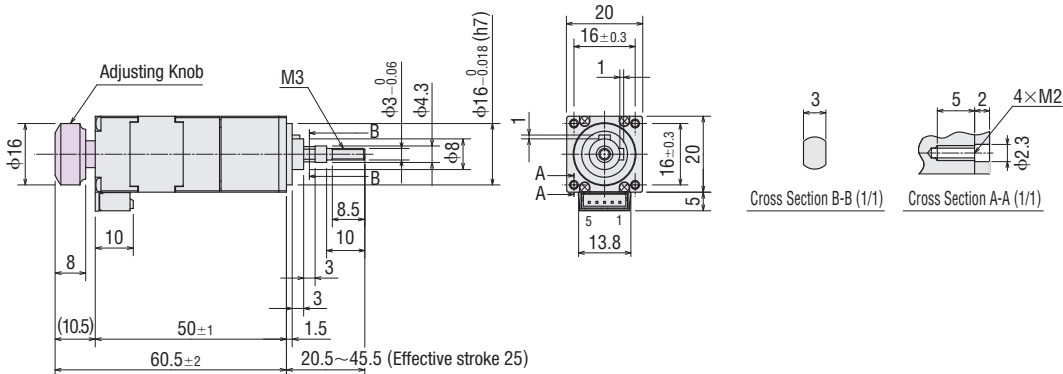
Dimensions (Unit = mm)

● Actuator

◇ Standard Type

1 Frame Size 20 mm

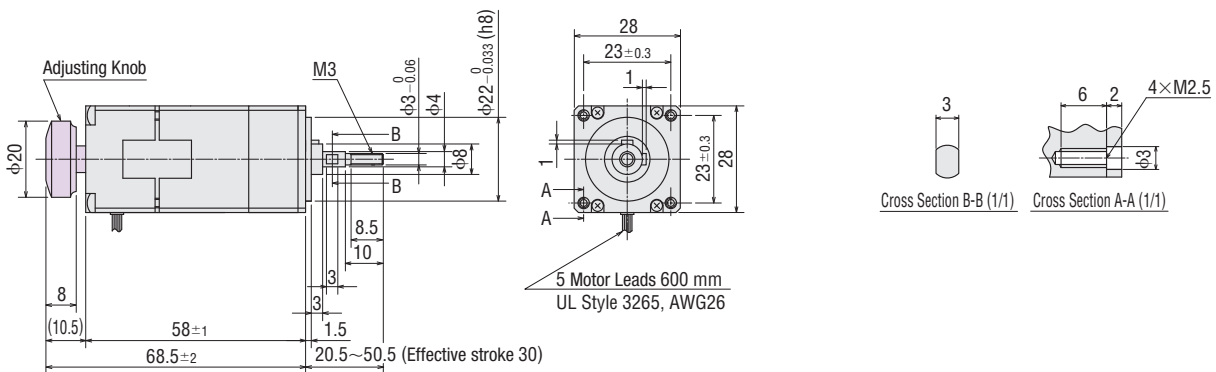
Product Name	Actuator Product Name	Mass kg
DRL20PB1-02G	DRL20PB1-02	0.08
DRL20PB1-02NG	DRL20PB1-02N	0.08



● The actuator comes with a connection cable (0.6 m).
UL Style 3265, AWG24

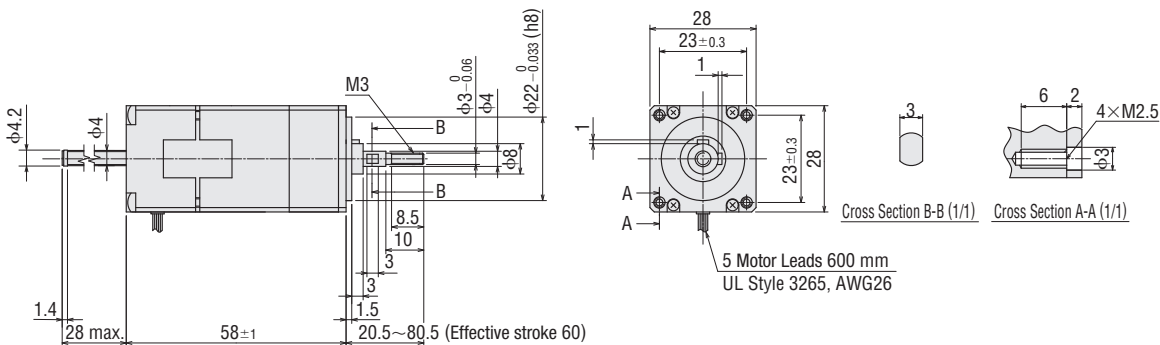
2 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRL28PB1-03G	DRL28PB1-03	0.18
DRL28PB1-03NG	DRL28PB1-03N	0.19



3 Frame Size 28 mm

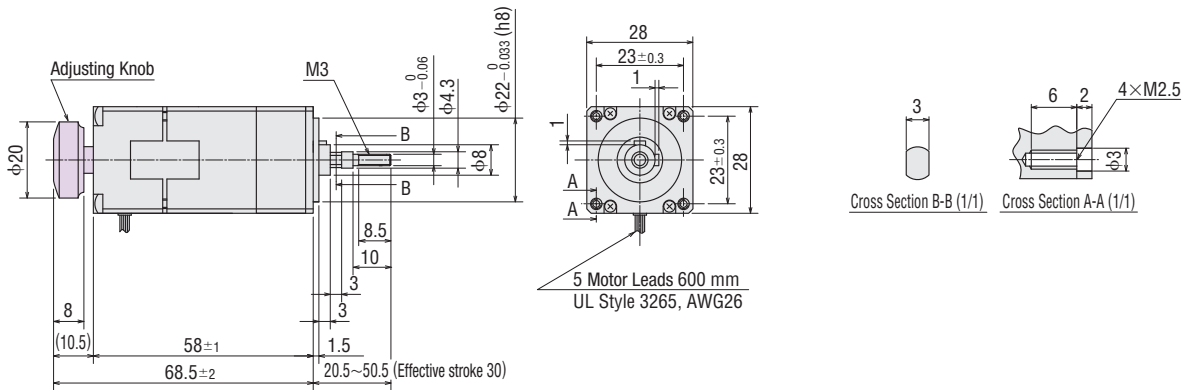
Product Name	Actuator Product Name	Mass kg
DRL28PB1-06G	DRL28PB1-06	0.18



● The dimensions of 1 and 2 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in shaded areas should be ignored.

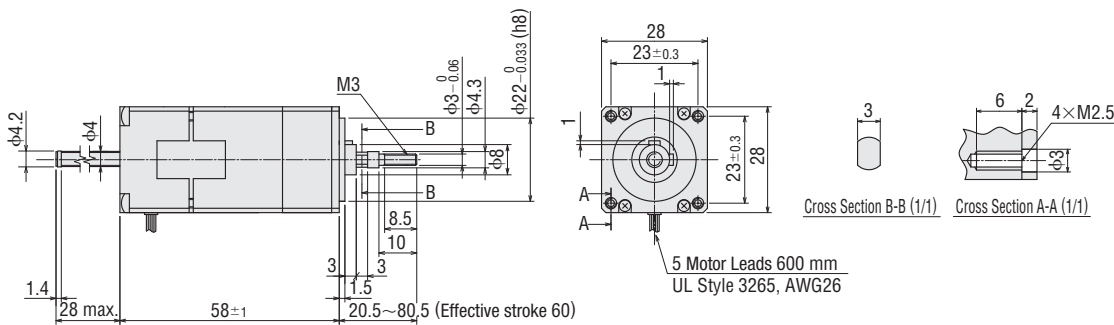
4 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRL28PA1-03G	DRL28PA1-03	0.18
DRL28PA1-03NG	DRL28PA1-03N	0.19



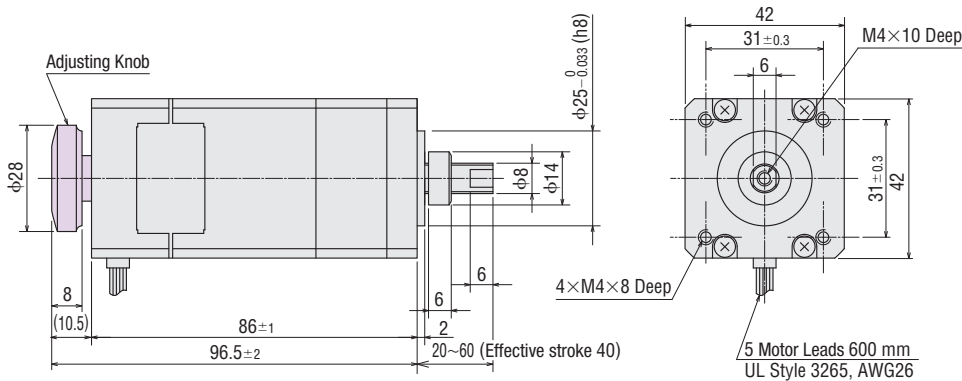
5 Frame Size 28 mm

Product Name	Actuator Product Name	Mass kg
DRL28PA1-06G	DRL28PA1-06	0.18



6 Frame Size 42 mm

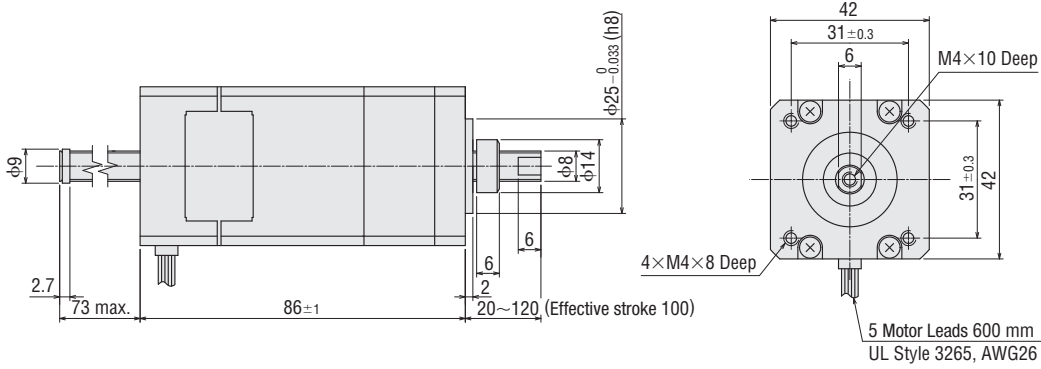
Product Name	Actuator Product Name	Mass kg
DRL42PB2-04G	DRL42PB2-04	0.6
DRL42PB2-04NG	DRL42PB2-04N	0.6
DRL42PA2-04G	DRL42PA2-04	0.6
DRL42PA2-04NG	DRL42PA2-04N	0.6



● The dimensions of 4 and 6 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in shaded areas should be ignored.

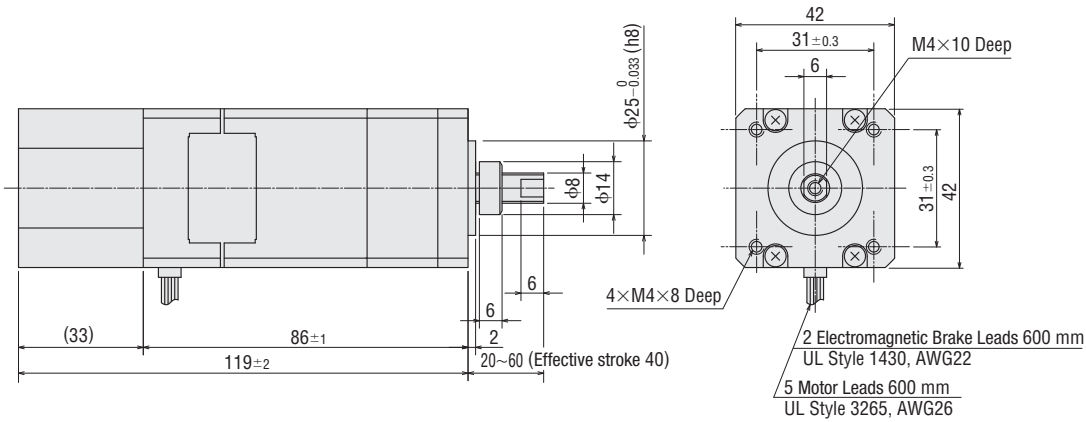
7 Frame Size 42 mm

Product Name	Actuator Product Name	Mass kg
DRL42PB2-10G	DRL42PB2-10	0.63
DRL42PA2-10G	DRL42PA2-10	0.63



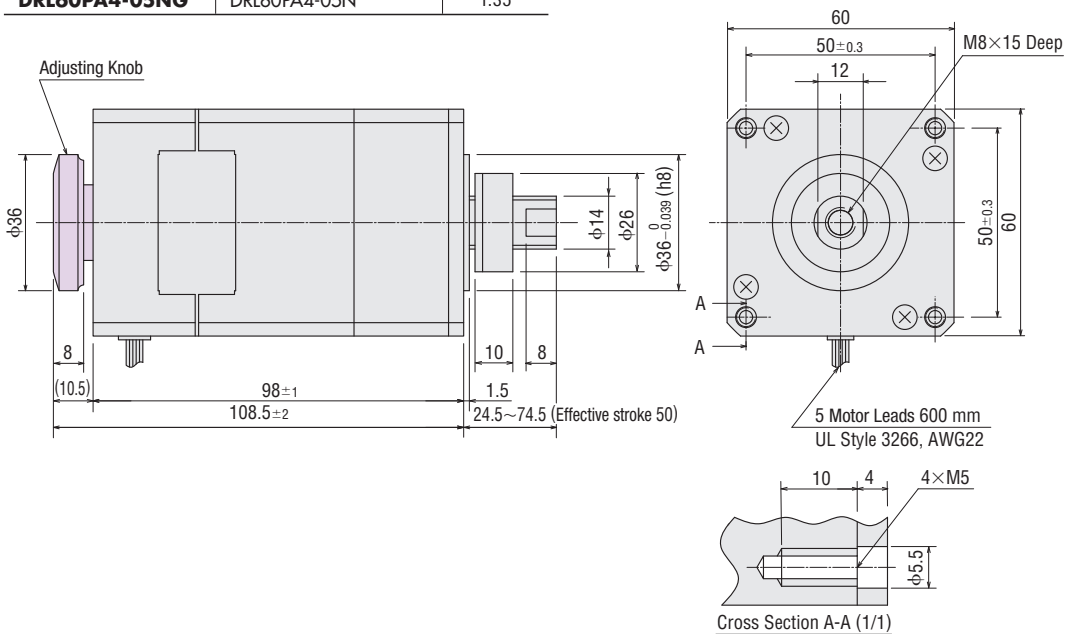
8 Frame Size 42 mm

Product Name	Actuator Product Name	Mass kg
DRL42PB2-04MG	DRL42PB2-04M	0.8
DRL42PA2-04MG	DRL42PA2-04M	0.8



9 Frame Size 60 mm

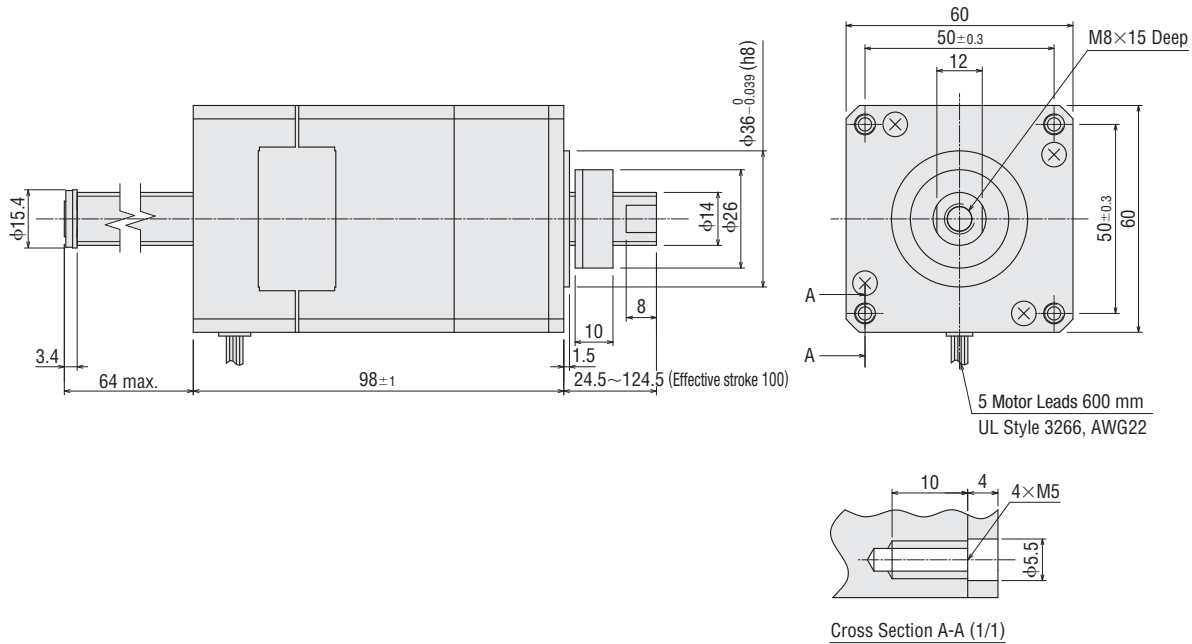
Product Name	Actuator Product Name	Mass kg
DRL60PB4-05G	DRL60PB4-05	1.3
DRL60PB4-05NG	DRL60PB4-05N	1.35
DRL60PA4-05G	DRL60PA4-05	1.3
DRL60PA4-05NG	DRL60PA4-05N	1.35



● The dimensions of 9 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in areas should be ignored.

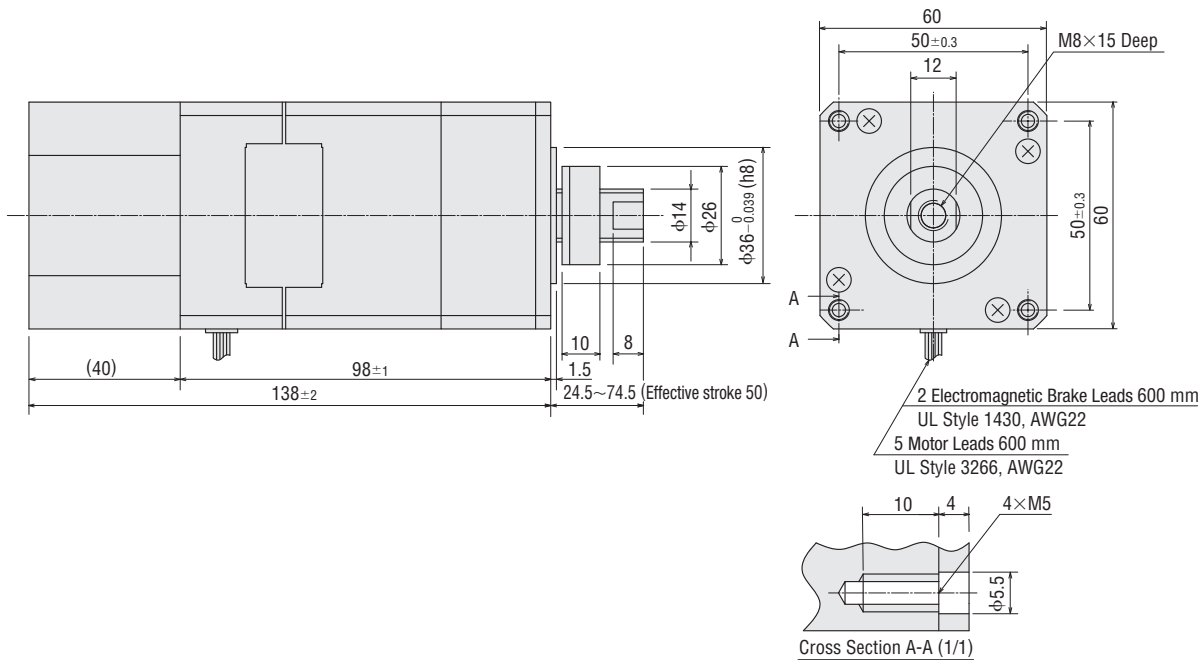
10 Frame Size 60 mm

Product Name	Actuator Product Name	Mass kg
DRL60PB4-10G	DRL60PB4-10	1.38
DRL60PA4-10G	DRL60PA4-10	1.38



11 Frame Size 60 mm

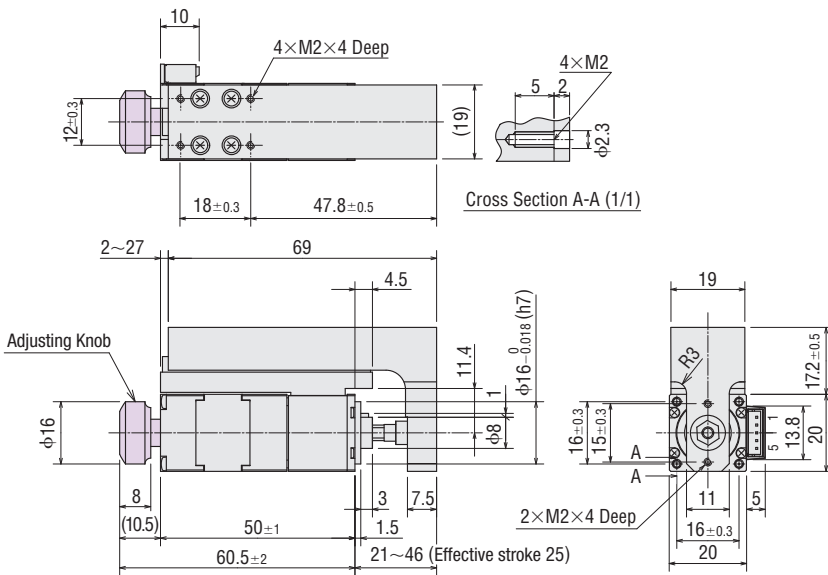
Product Name	Actuator Product Name	Mass kg
DRL60PB4-05MG	DRL60PB4-05M	1.7
DRL60PA4-05MG	DRL60PA4-05M	1.7



◇ Guide Type

12 Frame Size 20 mm

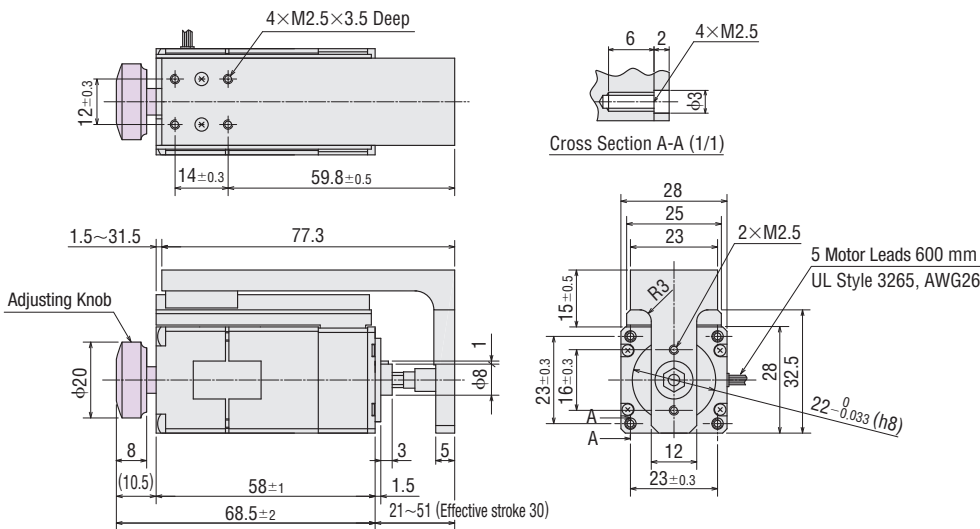
Product Name	Actuator Product Name	Mass kg
DRL20PB1G-02G	DRL20PB1G-02	0.14
DRL20PB1G-02NG	DRL20PB1G-02N	0.15



● The actuator comes with a connection cable (0.6 m).
UL Style 3265, AWG24

13 Frame Size 28 mm

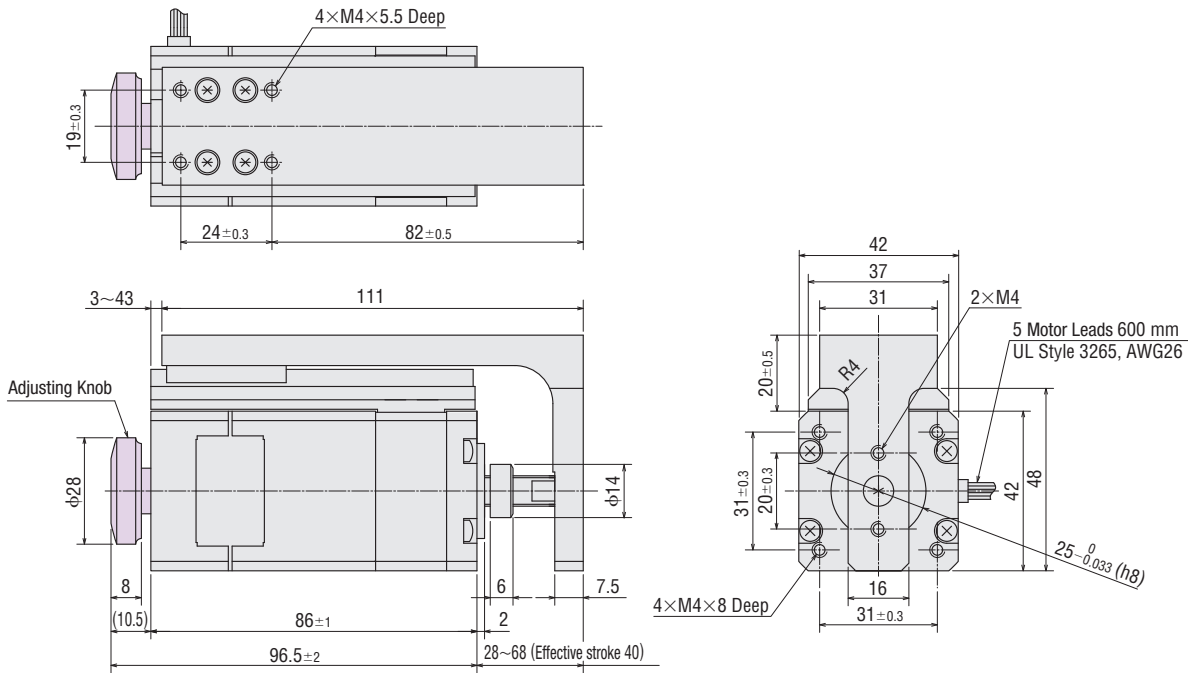
Product Name	Actuator Product Name	Mass kg
DRL28PA1G-03G	DRL28PA1G-03	0.25
DRL28PA1G-03NG	DRL28PA1G-03N	0.26
DRL28PB1G-03G	DRL28PB1G-03	0.25
DRL28PB1G-03NG	DRL28PB1G-03N	0.26



● The dimensions of 12 and 13 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in shaded areas should be ignored.

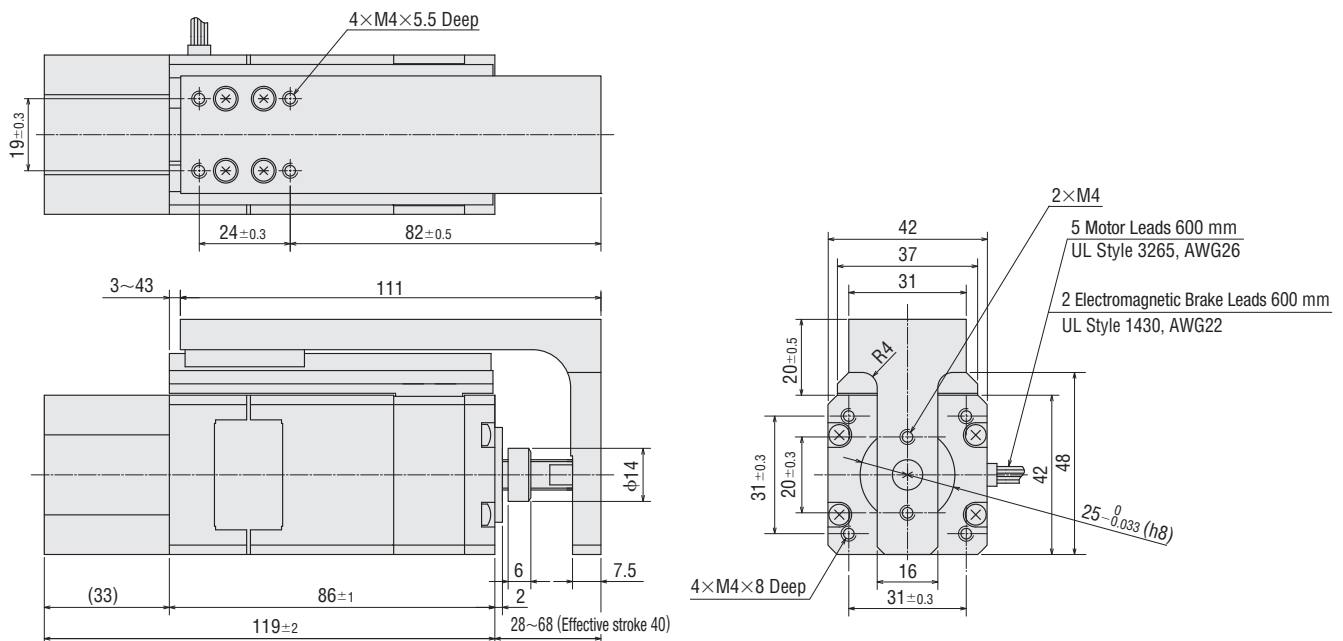
14 Frame Size 42 mm

Product Name	Actuator Product Name	Mass kg
DRL42PA2G-04G	DRL42PA2G-04	0.8
DRL42PA2G-04NG	DRL42PA2G-04N	0.8
DRL42PB2G-04G	DRL42PB2G-04	0.8
DRL42PB2G-04NG	DRL42PB2G-04N	0.8



15 Frame Size 42 mm

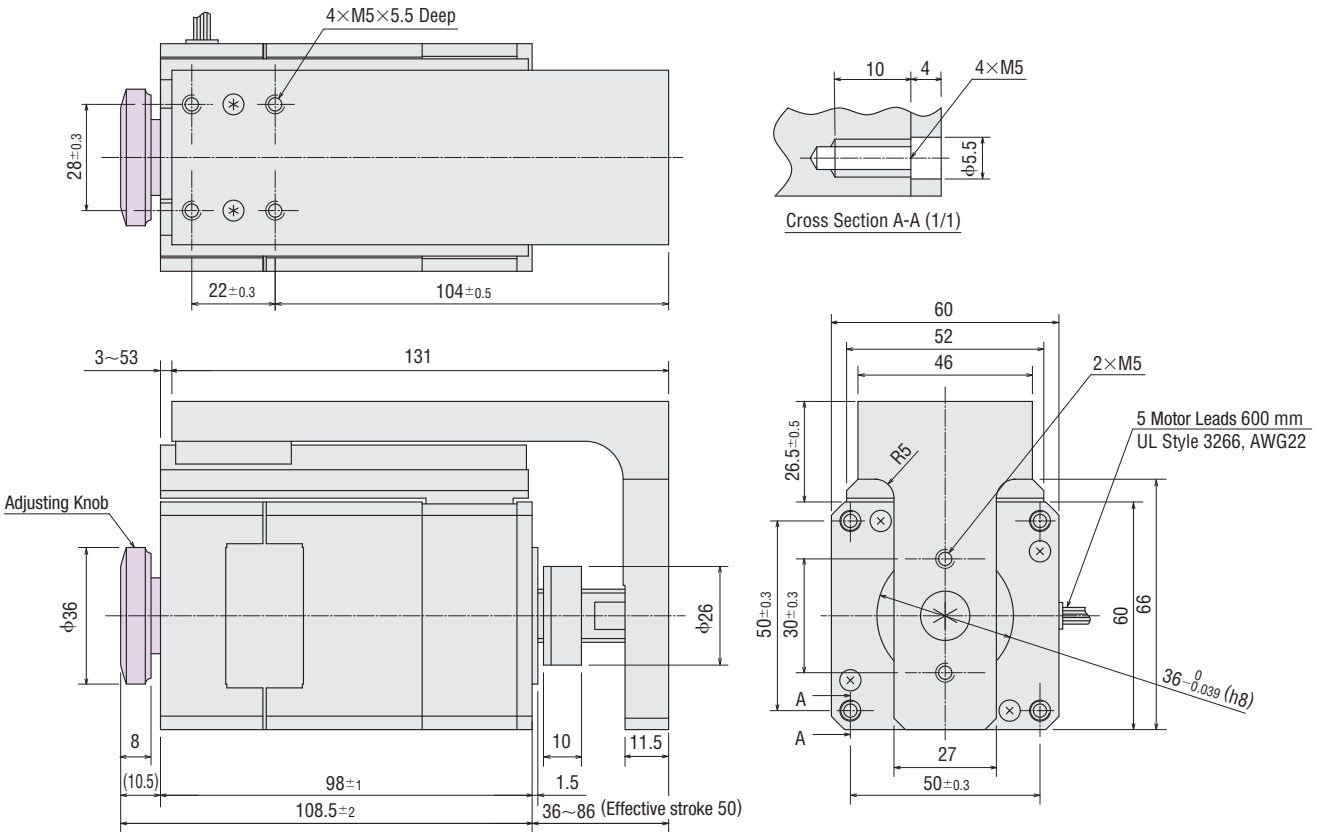
Product Name	Actuator Product Name	Mass kg
DRL42PA2G-04MG	DRL42PA2G-04M	1
DRL42PB2G-04MG	DRL42PB2G-04M	1



● The dimensions of 14 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in [] areas should be ignored.

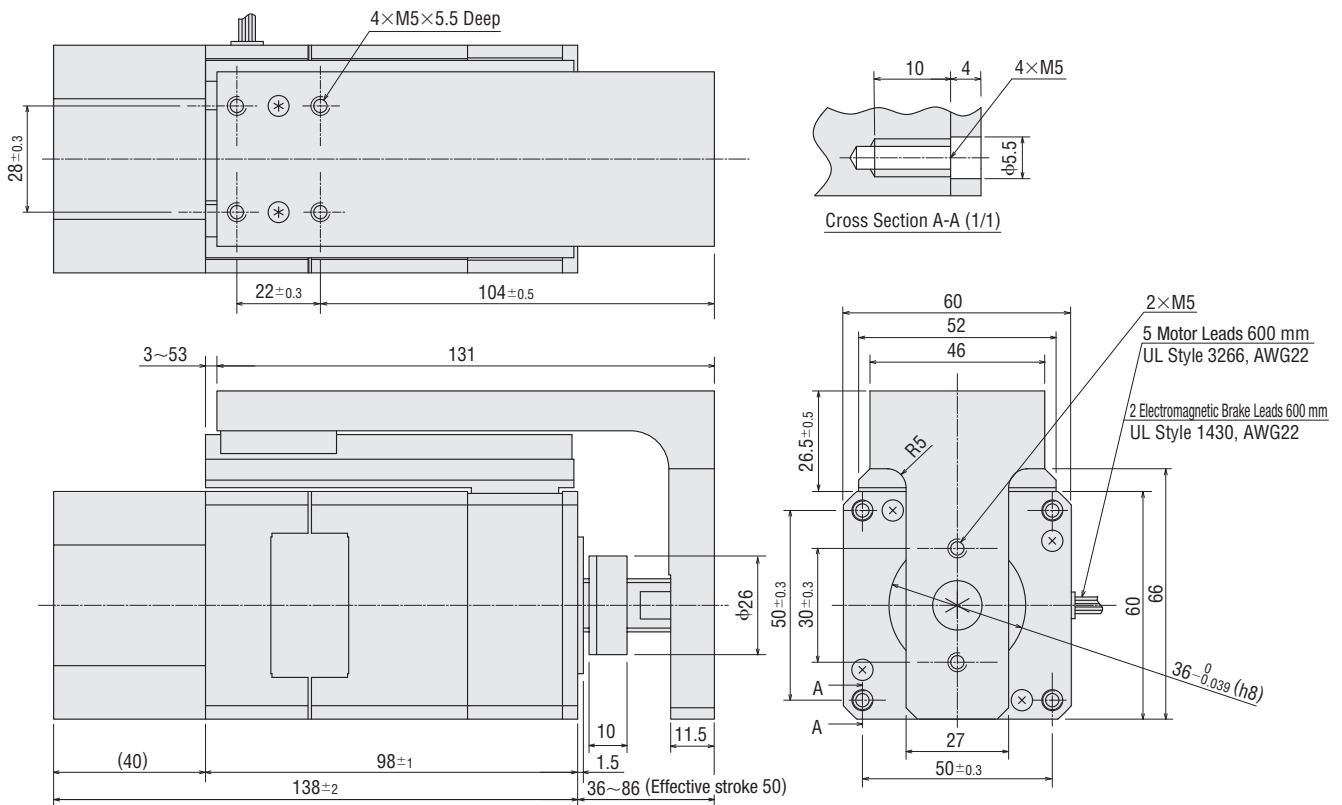
16 Frame Size 60 mm

Product Name	Actuator Product Name	Mass kg
DRL60PA4G-05G	DRL60PA4G-05	1.8
DRL60PA4G-05NG	DRL60PA4G-05N	1.85
DRL60PB4G-05G	DRL60PB4G-05	1.8
DRL60PB4G-05NG	DRL60PB4G-05N	1.85



17 Frame Size 60 mm

Product Name	Actuator Product Name	Mass kg
DRL60PA4G-05MG	DRL60PA4G-05M	2.2
DRL60PB4G-05MG	DRL60PB4G-05M	2.2



● The dimensions of 16 apply to a configuration with an adjusting knob. For products without additional functions, the shaft and adjusting knob shown in shaded areas should be ignored.

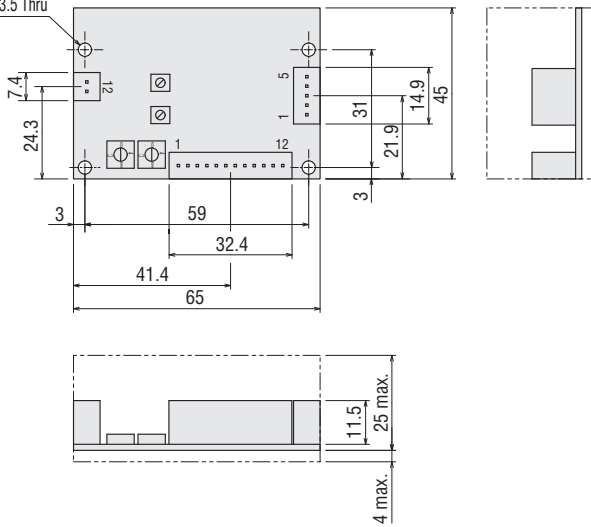
● Driver

18

Driver Product Name: CRD5103P, CRD5107P, CRD5114P

Mass: 0.04 kg

4× ϕ 3.5 Thru



- Included (Molex)
- Connector Housing
 - 51103-1200
 - 51103-0500
 - 51103-0200
- Contact
 - 50351-8100

Note

- When assembling the connectors, use the hand crimp tool for contact [57295-5000 (Molex)]. Or, use the driver cable set consisting of cables already crimped with connectors (sold separately). The crimp tool is not included. Please provide separately. Driver Cable Set → Page E-157

Introduction

Motorized Linear Slides
EZlimo EZSII
EZlimo SPV/

Motorized Cylinders
EZlimo EZCII
EZlimo EZA

Common
Linear Slides/Cylinders
Controllers
Accessories

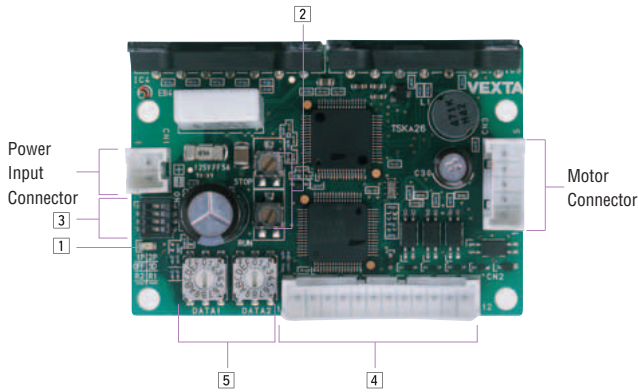
Compact Linear Actuators
DR5
DRL
Accessories

Rack and Pinion Systems
LAS
LS
Accessories

Hollow Rotary Actuators
DG
Accessories

Connection and Operation

Names and Functions of Driver Parts



1 Power Input Indicator

Color	Function	Lighting Condition
Green	Power Supply Indication	When power is applied

2 Current Adjustment Potentiometers

Indication	Potentiometer Name	Functions
RUN	Motor Operating Current Adjustment Potentiometer	For adjusting the operating current of the motor
STOP	Motor Standstill Current Adjustment Potentiometer	For adjusting the standstill current of the motor

3 Function Switches

Indication	Switch Name	Functions
1P/2P	Pulse Input Mode Switch	Switches between 1-pulse input mode and 2-pulse input mode
OFF/SD	Smooth Drive Function Switch	Switches the smooth drive function to enabled or disabled
R2/R1	Resolution Select Switch	Switches the base resolution between R1 and R2

4 I/O Signals

Indication	I/O	Pin No.	Signal Name	Functions
CN2	Input Signals	1	Pulse Signal (CW Pulse Signal)	Operation command pulse signal (The motor will rotate in the CW direction when in 2-pulse input mode.)
		2		
		3	Traveling Direction Signal (CCW Pulse Signal)	Traveling direction signal Photocoupler ON: CW, photocoupler OFF: CCW (The motor will rotate in the CCW direction when in 2-pulse input mode.)
		4		
		5	All Windings Off Signal	This signal is used to turn off the output current to the motor to allow for position adjustment of the screw shaft using an external force.
		6		
		7	Resolution Select Signal	This signal is used to switch to the resolution set in DATA1 and DATA2
		8		
		9	Automatic Current Cutback Release Signal	This signal is used to disable the automatic current cutback function.
		10		
Output Signal	Output Signal	11	Excitation Timing Signal	This signal is output when the excitation sequence is at STEP "0."
		12		

5 Resolution Setting Switches

Indication	Switch Name	Function
DATA1	Resolution Setting Switch	Each switch can be set to the desired resolution from the 16 resolution levels.
DATA2		

DRL20, DRL28

R1			R2		
Resolution Setting Switch	Microsteps/Step 1	Resolution 1 (mm)	Resolution Setting Switch	Microsteps/Step 2	Resolution 2 (mm)
DATA1, DATA2			DATA1, DATA2		
0	1	0.002	0	×2.5	0.005
1	2	0.001	1	×1.25	0.0025
2	2.5	0.0008	2	1.6	0.00125
3	4	0.0005	3	2	0.001
4	5	0.0004	4	3.2	0.000625
5	8	0.00025	5	4	0.0005
6	10	0.0002	6	6.4	0.0003125
7	20	0.0001	7	10	0.0002
8	25	0.00008	8	12.8	0.00015625
9	40	0.00005	9	20	0.0001
A	50	0.00004	A	25.6	0.000078125
B	80	0.000025	B	40	0.00005
C	100	0.00002	C	50	0.00004
D	125	0.000016	D	51.2	0.0000390625
E	200	0.00001	E	100	0.00002
F	250	0.000008	F	102.4	0.00001953125

DRL42

R1			R2		
Resolution Setting Switch	Microsteps/Step 1	Resolution 1 (mm)	Resolution Setting Switch	Microsteps/Step 2	Resolution 2 (mm)
DATA1, DATA2			DATA1, DATA2		
0	1	0.004	0	×2.5	0.01
1	2	0.002	1	×1.25	0.005
2	2.5	0.0016	2	1.6	0.0025
3	4	0.001	3	2	0.002
4	5	0.0008	4	3.2	0.00125
5	8	0.0005	5	4	0.001
6	10	0.0004	6	6.4	0.000625
7	20	0.0002	7	10	0.0004
8	25	0.00016	8	12.8	0.0003125
9	40	0.0001	9	20	0.0002
A	50	0.00008	A	25.6	0.00015625
B	80	0.00005	B	40	0.0001
C	100	0.00004	C	50	0.00008
D	125	0.000032	D	51.2	0.000078125
E	200	0.00002	E	100	0.00004
F	250	0.000016	F	102.4	0.0000390625

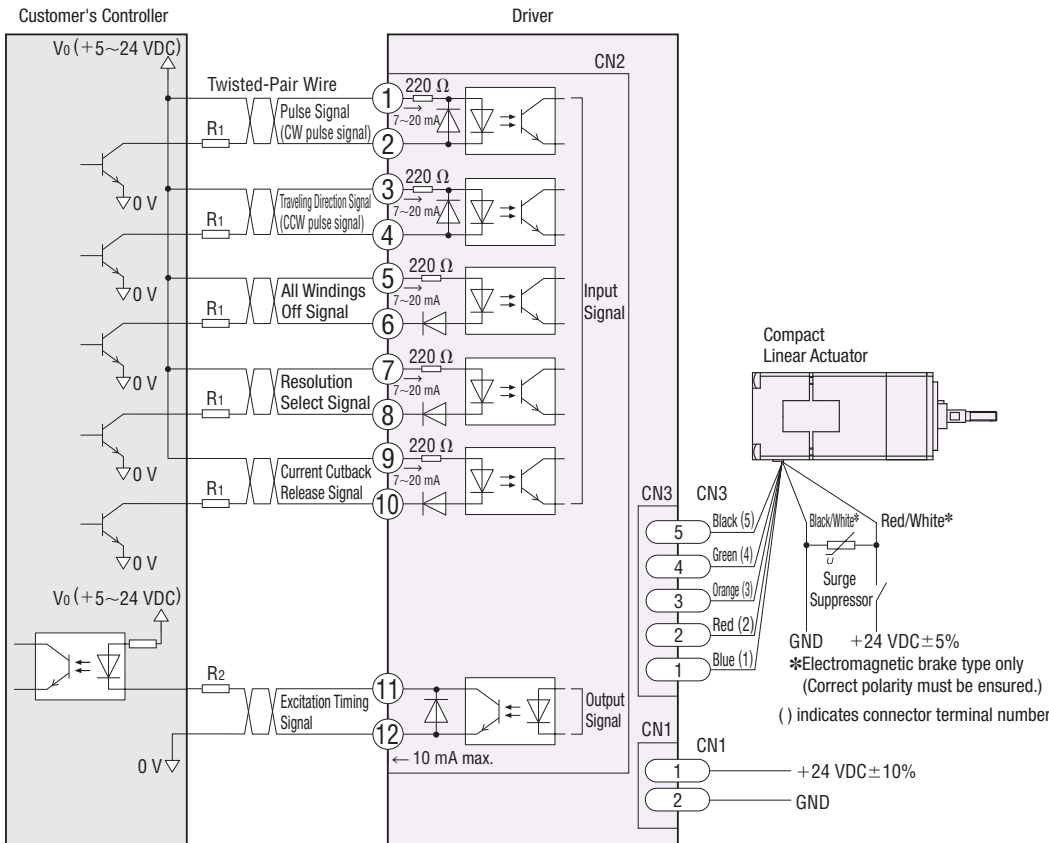
DRL60

R1			R2		
Resolution Setting Switch	Microsteps/Step 1	Resolution 1 (mm)	Resolution Setting Switch	Microsteps/Step 2	Resolution 2 (mm)
DATA1, DATA2			DATA1, DATA2		
0	1	0.008	0	×2.5	0.02
1	2	0.004	1	×1.25	0.01
2	2.5	0.0032	2	1.6	0.005
3	4	0.002	3	2	0.004
4	5	0.0016	4	3.2	0.0025
5	8	0.001	5	4	0.002
6	10	0.0008	6	6.4	0.00125
7	20	0.0004	7	10	0.0008
8	25	0.00032	8	12.8	0.000625
9	40	0.0002	9	20	0.0004
A	50	0.00016	A	25.6	0.0003125
B	80	0.0001	B	40	0.0002
C	100	0.00008	C	50	0.00016
D	125	0.000064	D	51.2	0.00015625
E	200	0.00004	E	100	0.00008
F	250	0.000032	F	102.4	0.000078125

Note

- The resolutions are theoretical values.
- The resolution is calculated by dividing the basic resolution by the number of microstep.
- Number of microsteps that can be specified by the "Resolution Select" signal (C/S) are limited to those selected in resolution 1 or resolution 2.
- Do not change the "Resolution Select" signal (C/S) input or resolution select switch while the actuator is operating.
This may cause a malfunction with the actuator.

● Connection Diagram



Notes on Wiring

◇ I/O Signal Connection

● Input Signal

The external resistor is not needed when the voltage is 5 VDC. If voltage exceeding 5 VDC is applied, connect an external resistor R_1 so that the current becomes 7 to 20 mA.
Example: V_0 is 24 VDC, R_1 : 1.5 to 2.2 k Ω 0.5 W or more

● Output Signal

Check the specifications of all devices to be connected and if the current will exceed 10 mA, connect an external resistor R_2 .

- Use a twisted-pair wire of AWG24 to 22 (0.2 to 0.3 mm²).
- Since the maximum transmissible frequency drops as the pulse line becomes longer, keep the wiring length as short as possible (within 2 m).
- Provide a minimum distance of 20 mm between the I/O signal lines and power lines (power supply lines, motor lines, etc.).

◇ Power Connection

- Use wires of AWG22 (0.3 mm²).
- Incorrect polarities of the DC power supply input will lead to driver damage. Make sure that the polarity is correct before turning power on.

◇ Extension of Motor Cable

- Use a wire of AWG22 (0.3 mm²) or thicker.
- Keep the distance between the actuator and driver to 10 m or less.

◇ Connecting the Electromagnetic Brake

- Use a shielded cable of AWG24 (0.2 mm²) or thicker.
- Use the following power supplies for electromagnetic brakes:
DRL42: 24 VDC±5% 0.1 A or more
DRL60: 24 VDC±5% 0.3 A or more
- Connect the red/white lead wire from the actuator to the +24 VDC terminal on the DC power supply and the black/white lead wire to the GND terminal on the DC power supply.
- Correct polarity (+ and -) must be ensured when connecting the electromagnetic brake lead wires to the DC power supply. If polarity is incorrect, the electromagnetic brake will not be released.
- Keep the wiring distance as short as possible to suppress noise.
- To protect the switch contacts and prevent noise, always connect a surge suppressor (included).

◇ General

- A separate hand crimp tool is required to crimp the included connector and lead wire. The accessory driver cable set (sold separately) comes with all lead wires already crimped.
- If noise generated by the motor cable or power supply cable causes a problem with the specific wiring or layout, shield the cable or use ferrite cores.

Actuator and Driver Combinations

● Rolled Ball Screw Type

Frame Size (mm)	Type	Additional Functions	Product Name	Actuator Product Name	Driver Product Name
□28	Standard Type	Without Additional Function	DRL28PA1-03G	DRL28PA1-03	CRD5107P
		With Adjusting Knob	DRL28PA1-06G	DRL28PA1-06	
	Guide Type	Without Additional Function	DRL28PA1G-03G	DRL28PA1G-03	
		With Adjusting Knob	DRL28PA1G-03NG	DRL28PA1G-03N	
□42	Standard Type	Without Additional Function	DRL42PA2-04G	DRL42PA2-04	
		With Electromagnetic Brake	DRL42PA2-10G	DRL42PA2-10	
		With Adjusting Knob	DRL42PA2-04MG	DRL42PA2-04M	
	Guide Type	Without Additional Function	DRL42PA2G-04G	DRL42PA2G-04	
		With Electromagnetic Brake	DRL42PA2G-04MG	DRL42PA2G-04M	
		With Adjusting Knob	DRL42PA2G-04NG	DRL42PA2G-04N	
□60	Standard Type	Without Additional Function	DRL60PA4-05G	DRL60PA4-05	CRD5114P
		With Electromagnetic Brake	DRL60PA4-10G	DRL60PA4-10	
		With Adjusting Knob	DRL60PA4-05MG	DRL60PA4-05M	
	Guide Type	Without Additional Function	DRL60PA4G-05G	DRL60PA4G-05	
		With Electromagnetic Brake	DRL60PA4G-05MG	DRL60PA4G-05M	
		With Adjusting Knob	DRL60PA4G-05NG	DRL60PA4G-05N	

● Ground Ball Screw Type

Frame Size (mm)	Type	Additional Functions	Product Name	Actuator Product Name	Driver Product Name
□20	Standard Type	Without Additional Function	DRL20PB1-02G	DRL20PB1-02	CRD5103P
		With Adjusting Knob	DRL20PB1-02NG	DRL20PB1-02N	
	Guide Type	Without Additional Function	DRL20PB1G-02G	DRL20PB1G-02	
		With Adjusting Knob	DRL20PB1G-02NG	DRL20PB1G-02N	
□28	Standard Type	Without Additional Function	DRL28PB1-03G	DRL28PB1-03	CRD5107P
		With Adjusting Knob	DRL28PB1-06G	DRL28PB1-06	
	Guide Type	Without Additional Function	DRL28PB1G-03G	DRL28PB1G-03	
		With Adjusting Knob	DRL28PB1G-03NG	DRL28PB1G-03N	
□42	Standard Type	Without Additional Function	DRL42PB2-04G	DRL42PB2-04	
		With Electromagnetic Brake	DRL42PB2-10G	DRL42PB2-10	
		With Adjusting Knob	DRL42PB2-04MG	DRL42PB2-04M	
	Guide Type	Without Additional Function	DRL42PB2G-04G	DRL42PB2G-04	
		With Electromagnetic Brake	DRL42PB2G-04MG	DRL42PB2G-04M	
		With Adjusting Knob	DRL42PB2G-04NG	DRL42PB2G-04N	
□60	Standard Type	Without Additional Function	DRL60PB4-05G	DRL60PB4-05	CRD5114P
		With Electromagnetic Brake	DRL60PB4-10G	DRL60PB4-10	
		With Adjusting Knob	DRL60PB4-05MG	DRL60PB4-05M	
	Guide Type	Without Additional Function	DRL60PB4G-05G	DRL60PB4G-05	
		With Electromagnetic Brake	DRL60PB4G-05MG	DRL60PB4G-05M	
		With Adjusting Knob	DRL60PB4G-05NG	DRL60PB4G-05N	

Introduction

EZlimo
EZSII
Motorized Linear Slides

EZlimo
EZCII
EZlimo
EZA
Motorized Cylinders

Common
Controllers
Accessories
Linear Slides/Cylinders

DR5
DRL
Accessories
Compact Linear Actuators

LAS
LS
Accessories
Rack and Pinion Systems

DG
Accessories
Hollow Rotary Actuators

Compact Linear Actuators Accessories (Sold separately)

Mounting Plates (RoHS)

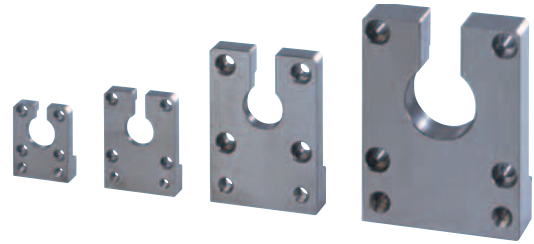
These are dedicated mounting brackets used for installing the compact linear actuators.

Each mounting plate comes with mounting screws for mounting the actuator to the plate.

● Please provide mounting screws for installing the mounting plate to the equipment.

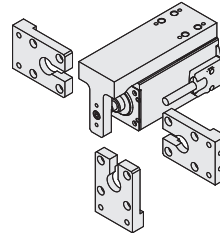
Material: Iron

Surface Treatment: Electroless nickel plating



Product Line

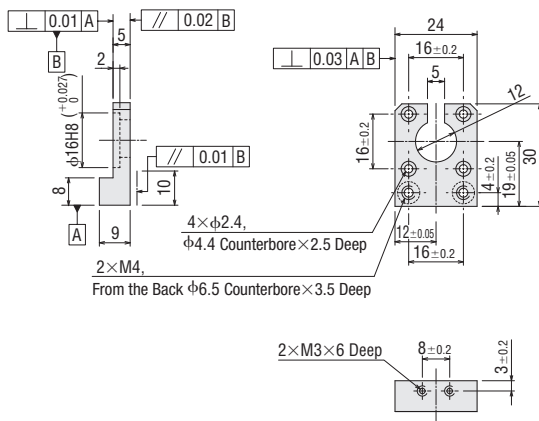
Product Name	Applicable Product	Mass (g)
PADRL-20	DRL20	25
PADRL-28	DRS28/DRL28	45
PADRL-42	DRS42/DRL42	165
PADRL-60	DRL60	570



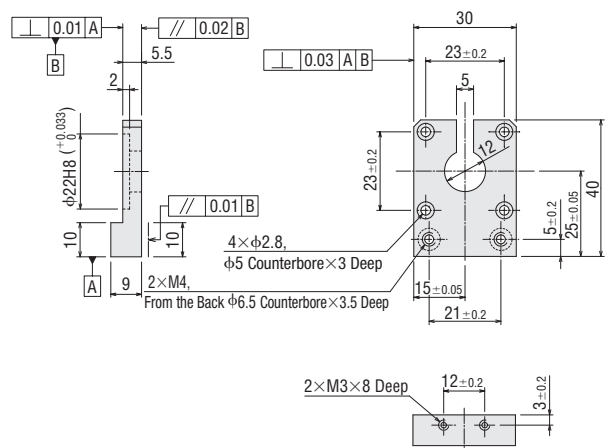
The actuator can be installed from one of three directions according to your equipment. (The **PADRL-20** can be installed only from the bottom.)

Dimensions (Unit = mm)

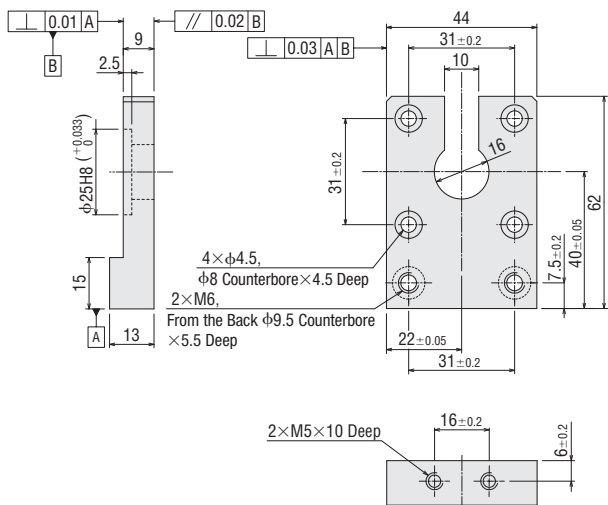
PADRL-20



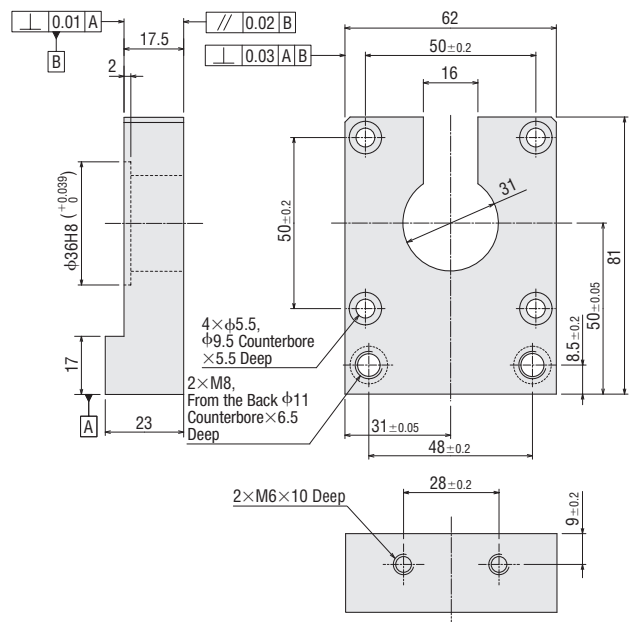
PADRL-28



PADRL-42



PADRL-60



Extension Cables (Applicable Product: DRS Series) (RoHS)

Extension Cables

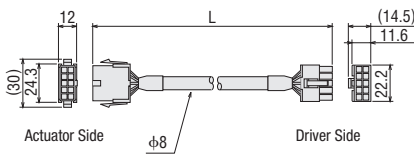


These extension cables are used when the distance between the actuator and driver is 0.4 m or more (0.18 m or more if the actuator's frame size is 28 mm).

Product Line

Product Name	Length L (m)
CC01AIP	1
CC02AIP	2
CC03AIP	3
CC05AIP	5
CC07AIP	7
CC10AIP	10

Dimensions (Unit = mm)



Flexible Extension Cables

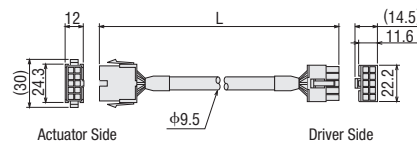


These flexible extension cables are used between the actuator and driver. We recommend this cable when the motor is installed on a moving part and the cable is bent and flexed.

Product Line

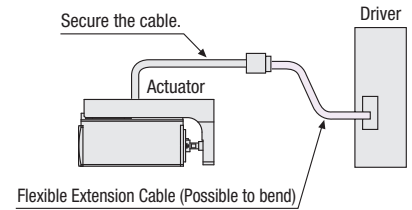
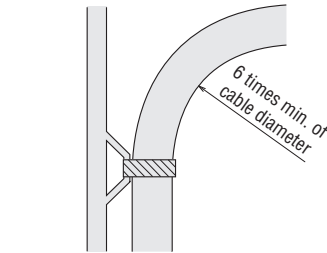
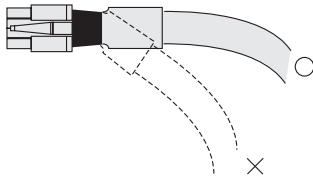
Product Name	Length L (m)
CC01SAR	1
CC02SAR	2
CC03SAR	3
CC05SAR	5
CC07SAR	7
CC10SAR	10

Dimensions (Unit = mm)



Notes on Use of a Flexible Extension Cable

- Do not allow the cable to bend at the cable connector.
- For the bending radius, use at six times or more of the cable diameter.
- If the motor cable is to be bent, bend it at the flexible extension cable.



Connection Cables (Applicable Product: DRL Series) (RoHS)

This lead wire with connector is convenient for connecting connector-coupled actuators. They eliminate the need for assembling the lead wire and connector. (Connection cables of 0.6 m are included with the **DRL20**.)

Product Line

Product Name	Applicable Product	Length (m)	Conductor AWG
LC5N06A	DRL20	0.6	24
LC5N10A		1	(0.2 mm ²)

Motor Connector Set (Applicable Product: DRL Series) RoHS

This is a set of connector housings and contacts for use with connector-coupled motors. Each package contains enough housings and contacts for 30 actuators.

Product Line

Product Name	Applicable Product
CS5N30A	DRL20

Specifications

Connector Housing	Contact	Applicable Crimp Tool	Manufacturer	Applicable Cable
51065-0500	50212-8100	57176-5000	Molex	AWG30~24 (0.05~0.2 mm ²) Outer Sheath Diameter ϕ 1.4 mm max. Strip length is 1.3~1.8 mm.



Note

- The crimp tool is not included. Please provide separately.

General-Purpose Cables (Applicable Product: DRS Series) RoHS

These shielded cables have a half-pitch connector at one end of the cable for easy connecting to the driver.

Note

- Note that as the length of the pulse signal line between the driver and controller increases, the maximum transmission frequency decreases. Technical reference → Page G-64
- Install a connector that matches the controller you are using to the other end of the cable.

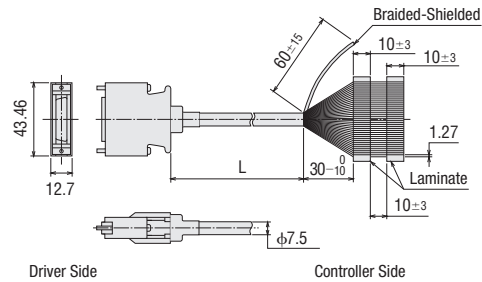


Product Line

Product Name	Length L (m)
CC36D1-1	1
CC36D2-1	2

Dimensions (Unit = mm)

Conductor: AWG28 (0.08 mm²)



Connector – Terminal Block Conversion Unit (Applicable Product: DRS Series) (RoHS)

This is a conversion unit that connects a driver to a programmable controller using a terminal block.

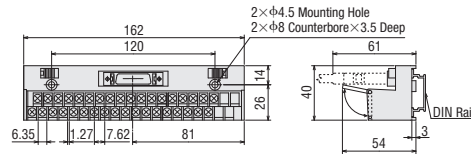
- Includes a signal name plate for easy, one-glance identification of driver signal names
- DIN-rail mountable
- Cable Length: 1 m

Product Line

Product Name
CC36T1

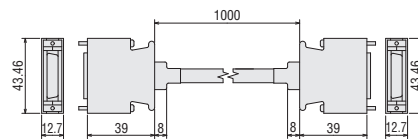


Dimensions (Unit = mm)

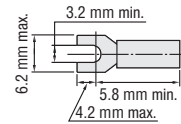


Terminal Block Pin No.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----



- Applicable Crimp Terminal
 - Terminal Screw Size: M3
 - Tightening Torque: 1.2 N·m
 - Minimum Applicable Lead Wire: AWG22 (0.3 mm²)
- Note**
- Round terminals cannot be used.



Driver Cable Set (Applicable Product: DRL Series) (RoHS)

These cables are for connecting the driver with the actuator, controller and DC power supply. The set includes three cables (for actuator, power supply and I/O signal). One end of the lead wire is crimped with a connector, therefore crimping is not necessary.

Product Line

Product Name	Length (m)	Conductor AWG
LCS04SD5	0.6	22 (0.3 mm ²)



DIN Rail Mounting Plate (RoHS)

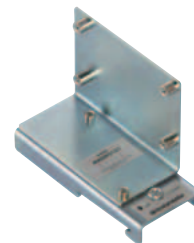
Installation, disassembly and positioning of the mounting plate to DIN rail is done with the fixing screw. A driver fixing screw is also included, which can be conveniently used without a separate spacer or screw.

Product Line

Product Name	Applicable Product
MADP02	DRS Series
MADP01S1	DRL Series



MADP02



MADP01S1

Motorized Actuators

Rack and Pinion Systems

Page

LAS Series	E-164
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LAS Series

LS Linear Heads

Accessories

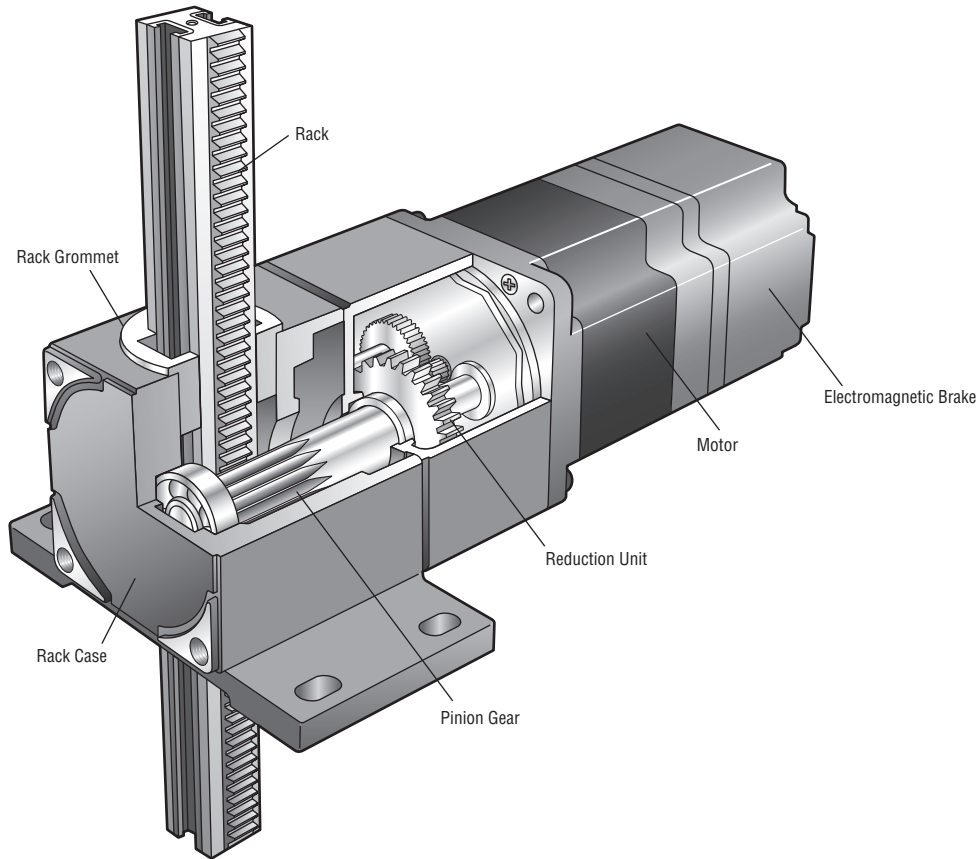
Introduction	EZlimo EZSII Motorized Linear Slides	EZlimo SPV Motorized Slides	EZlimo EZCII Motorized Cylinders	EZlimo EZA Motorized Cylinders	Common Controllers Linear Slides/Cylinders	Accessories	DRS Compact Linear Actuators	DRL Compact Linear Actuators	Accessories	LAS Rack and Pinion Systems	LS Rack and Pinion Systems	Accessories	DG Hollow Rotary Actuators	Accessories
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Features of Rack and Pinion Systems

A rack and pinion system is a linear and rotary actuator combining a rack-and-pinion mechanism with a motor of various types. Standard AC motors and *α*STEPS are provided for power unit.

Linear Motion Mechanism can be Realized Easily

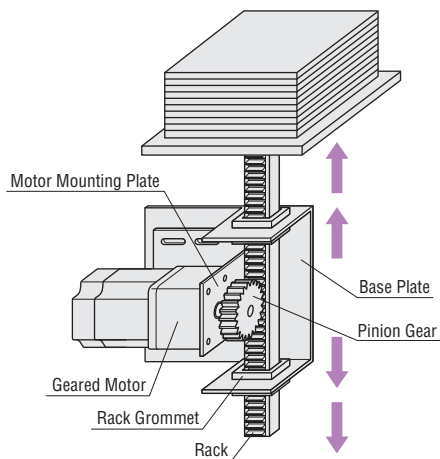
With a rack and pinion system, motor rotation can be easily converted to linear motion. Rotation of the pinion-shaft motor is received by the gear (reduction unit), and then transmitted through the pinion gear to the rack and finally converted to linear motion.



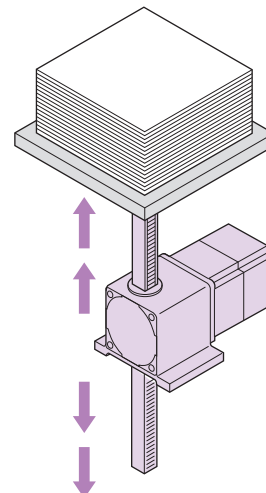
Substantially Fewer Parts and Man-Hours

A rack and pinion system is much smaller than any rack-and-pinion mechanism built in-house. It also lets you substantially reduce the number of parts and design and assembly man-hours compared to your existing linear motion systems.

In-House System

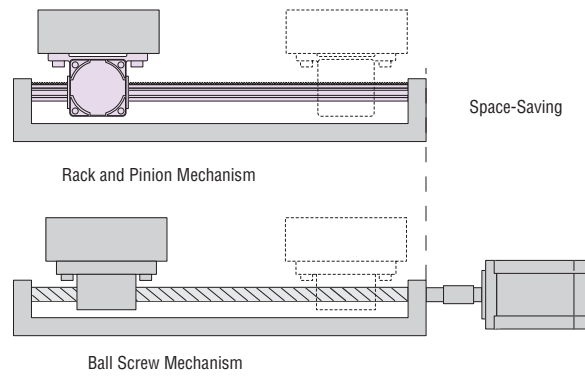


Rack and Pinion System



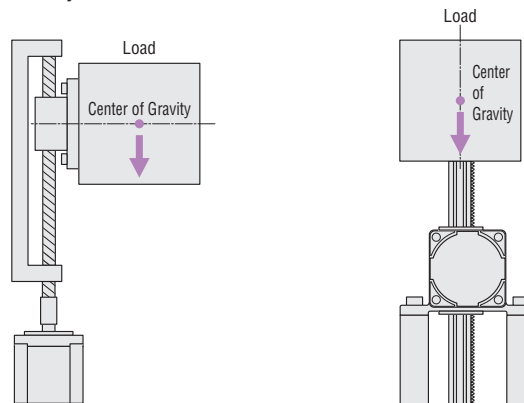
Space can be Effectively Utilized

The screw holes at both ends of the rack can be affixed to let the actuator travel. This structure is effective if the available motor space is limited.



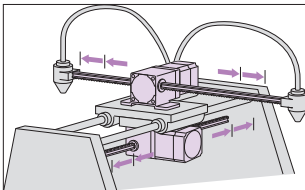
Large Load can be Transferred in Vertical Operation

With a rack and pinion system, loads can be installed directly without calculating moments. If moments can be ignored, the maximum transportable mass can be transferred directly.

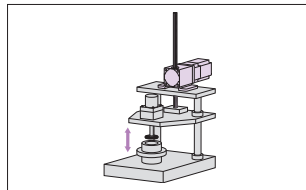


Applications

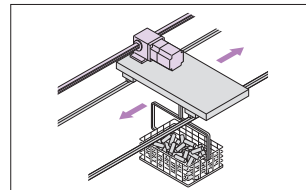
Our rack and pinion system products can be used in various applications, which are simple to use and can be selected easily just like any other component.



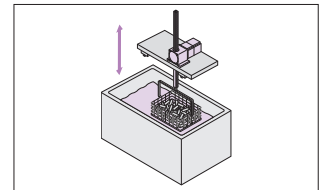
The motor itself travels, which lets you effectively utilize the available space.



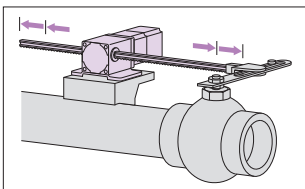
High thrust force can be utilized to lift a press or table directly.



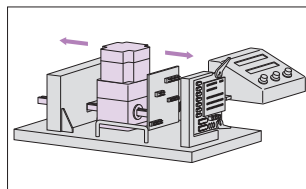
Models offering various strokes and speeds are available.



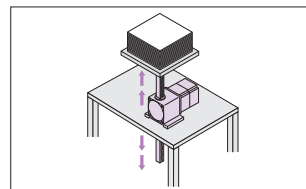
The screw holes at tips of the rack can be utilized to install a load or secure the rack with ease.



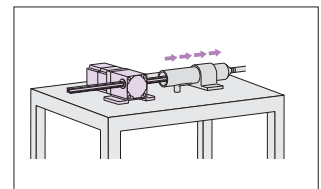
The rack moves to both right and left.



The mounting surface can be utilized to adjust the motor orientation according to your system.



Vertical operation is also easy. For prevention against the load from dropping, electromagnetic brake models are also available.



The slim, high-rigidity rack can implement feed operation in small space.

Types and Features of Rack and Pinion Systems

Lineared Motors (Control motors)

A "lineared motor" used for controlled operation consists of a stepping motor or *αSTEP* with a linear head. Lineared motors are ideal for applications requiring multi-point positioning or vertical operation involving speed adjustment.

Features

Reliable Control in Vertical and Horizontal Operation

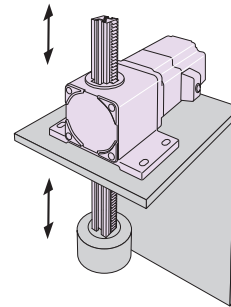
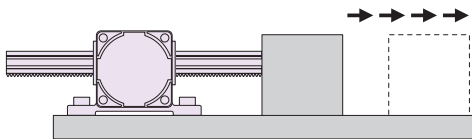
Lineared motors can easily meet various linear motion needs, such as speed adjustment and multi-point positioning, using a stepping motor or *αSTEP* as the drive motor.

Lineared motors adopting a control motor can implement speed adjustment in downward operation.

Also, the **LAS** Series offers electromagnetic brake models that can hold the load in position in the event of power outage and also outputs an alarm signal upon detection of an overload or malfunction.

Easy Setting of Travel Distance and Speed

Since *αSTEP* is used, a desired travel distance can be set flexibly based on pulse number output from the controller (pulse generator).



Linear Heads

A "linear head" can generate linear motion simply by combining a standard AC motor.

Linear heads can be combined with wide-ranging variations of standard AC motors, and are also available with many different strokes for use in simple operations such as push, pull, lift and lower.

Features

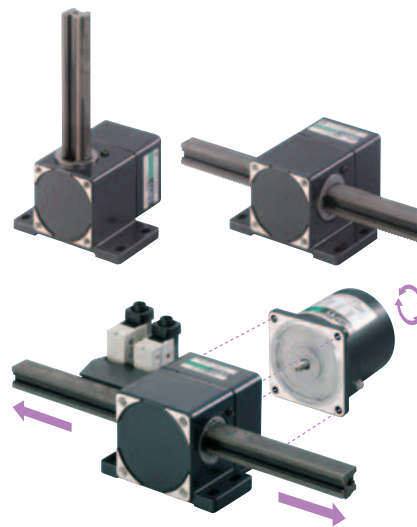
Easy to Achieve Linear Motion

Linear motion can be achieved easily using the rack-and-pinion mechanism.

The simple structure requires no coupling or conversion gear.

Applicable Motors

Linear heads can be combined with a standard AC motors to offer various specifications that can be used in a wide range of applications.



World K Series



Reversible Motor



Electromagnetic Brake Motor




Brake Pack

E502 and Speed Control Motor



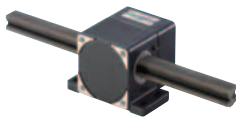
Selection of Rack and Pinion Systems

Lineared Motors (Control motors)

Product	Frame Size [mm]	Max. Transportable Mass [kg]	Stroke* [mm]	Max. Speed [mm/s]	Page
LAS Series 	60	30	100~800	500	E-164
	80	100	100~1000		

*Stroke can be specified in units of 100 mm.

Linear Heads

Product	Frame Size [mm]	Max. Transportable Mass [kg]	Stroke* [mm]	Max. Speed [mm/s]	Page
LS Linear Heads 	60	30	100~800	45	E-178
	80	100	100~1000		

*Stroke can be specified in units of 100 mm.

How to Read Specifications

LAS Series

Product Name	Single-Phase 100-115 VAC Single-Phase 200-230 VAC	Frame Size 60 mm		Frame Size 80 mm	
		LAS2□500AW-□	LAS2□500MW-□	LAS4□500AW-□	LAS4□500MW-□
Motor Type		<i>αSTEP</i>			
Electromagnetic Brake		Not Equipped	Equipped	Not Equipped	Equipped
① Operating Speed Range	mm/s	0~500			
② Maximum Transportable Mass	kg	10 (250 mm/s) 7 (500 mm/s)		20 (250 mm/s) 7 (500 mm/s)	
③ Maximum Acceleration	m/s ²	1			
④ Maximum Thrust Force	N	110 (250 mm/s) 77 (500 mm/s)		220 (250 mm/s) 77 (500 mm/s)	
		110		220	
Maximum Holding Force N	Power ON ⑤	0			
	Power OFF ⑥	0			
	Electromagnetic Brake ⑦	—	110	—	220
⑧ Resolution	mm/pulse	19.9948×10 ⁻³		20.0176×10 ⁻³	
⑨ Rotor Inertia	J: kg·m ²	405×10 ⁻⁷	564×10 ⁻⁷	405×10 ⁻⁷	564×10 ⁻⁷
Speed and Position Control Commands		Pulse input			
⑩ Stroke		100, 200, 300, 400, 500, 600, 700, 800		100, 200, 300, 400, 500, 600, 700, 800, 900, 1000	
Lineared Motor Mass () : with electromagnetic brake	kg	100: 1.7 (2.0) 200: 1.9 (2.2) 300: 2.1 (2.4) 400: 2.3 (2.6) 500: 2.5 (2.8) 600: 2.7 (3.0) 700: 2.9 (3.2) 800: 3.1 (3.4)		100: 2.8 (3.1) 200: 3.1 (3.4) 300: 3.4 (3.7) 400: 3.6 (3.9) 500: 3.9 (4.2) 600: 4.2 (4.5) 700: 4.5 (4.8) 800: 4.8 (5.1) 900: 5.1 (5.4) 1000: 5.4 (5.7)	
		100: 0.5 200: 0.6 300: 0.8 400: 1.0 500: 1.2 600: 1.4 700: 1.6 800: 1.8		100: 0.7 200: 1.0 300: 1.3 400: 1.5 500: 1.8 600: 2.1 700: 2.4 800: 2.7 900: 3.0 1000: 3.3	

- ① Operating Speed Range
The range of rack speed settings at which the load can be transferred.
- ② Maximum Transportable Mass
The maximum mass that can be transferred in the horizontal or vertical direction.
- ③ Maximum Acceleration
The maximum acceleration allowed when the maximum transportable mass is transferred.
- ④ Maximum Thrust Force
A calculated force that considers acceleration and friction. The maximum thrust force indicates the maximum force with which to push or pull the load. It is different from the maximum transferable load.

- ⑤ Maximum Holding Force (Power ON)
The maximum force with which to hold the rack in position if the rack stops while the power is still on.
- ⑥ Maximum Holding Force (Power OFF)
The maximum force with which to hold the rack in position if the rack stops after the power has been cut off.
- ⑦ Maximum Holding Force (Electromagnetic Brake)
The maximum force with which to hold the rack in position using an electromagnetic brake when the rack stops. (electromagnetic brake types only)
- ⑧ Resolution
The distance traveled by the rack every time the motor rotates for one pulse.

- ⑨ Rotor Inertia
The inertia of the rotor in the motor comprising the lineared motor. The rotor inertia must be considered when calculating the torque (acceleration torque) required by the motor.
- ⑩ Stroke
The distance that can be traveled by the rack. The total length of the rack is calculated as the sum of this stroke and the width of the rack case.